..THE IRON AGE..

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MOBILIZING FOR RECONSTRUCTION

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SINCE the dawn of recorded history, man has continually pushed forward, regardless of temporary setbacks.

Particularly in America, from the hazardous days of the pioneers of continental discovery, down to the different but still difficult present days with their more intricate problems, the record has been one of continual endeavor and progressive achievement.

Whenever Americans, with characteristic aggressiveness, have widely organized to accomplish a given purpose, it has usually been attained.

At no time, since the war spirit of 1917 mobilized and united American public sentiment, has there been as widespread a mobilization of purpose among all classes, conditions and kinds of our people, to attain a given end.

That end is reconstruction.

Partisanship has been set aside, even in a presidential year, in order that the road to recovery may be opened. Capital and labor are in closer accord today than at any time in our history. Minds of all kinds are thinking more clearly than before about our common problems and are meeting on common ground.

These are the signposts of hope that are pointing the way to the road to reconstruction. We are not fairly upon it yet, but at least we are not groping blindly in the dark, as we have been, not knowing what direction to take.

The men of the metal-working industry will put their shoulders wholeheartedly to the wheel in the common effort for reconstruction, knowing that the world will never cease to need better men, materials, methods and machinery.

John Van Deventer

ACCURATE MACHINING, AS TYPIFIED IN SMALL ARMS MAN U

ALL war time makers of fire arms were faced with grave problems with the return of peace in 1919. Many went out of existence and those who have survived have turned to other products either to substitute for or to augment the manufacture of small arms. One of the most successful in making the transition to a peace time basis was the Colt's Patent Firearms Mfg. Co., Hartford, Conn. Immediately after the war this company with a large plant and elaborate equipment on its hands bought out existing companies in other lines and developed new products to keep its spare equipment busy. At the same time it consolidated and reorganized its small arms manufacturing and today is regularly turning out many thousands of pistols each year in addition to a fair production of machine guns and other ordnance.

Recently the company has developed a new accurate pistol with many special features. It calls this pistol the 0.22 Ace and a description of some of the manufacturing details will serve to illustrate many of the problems of accurate machining required in the successful production of small arms.

When new complicated forming and punching operations are developed the material to be used must be studied as well as the design of the die and this is one reason that a uniform material is so important in the production of a complicated precision instrument such as an automatic pistol. Even a slight change in steel analysis or in heat treatment may mean that a crack will occur under dies which normally would work perfectly. In the development of a new small arms model, the designers may specify one grade of steel but the production managers or some department foreman may find that the working of this steel is extremely difficult and, therefore, although it may have the quality desired in the finished product, the use of other steels may be necessary in large scale commercial production. The final result is often a compromise between the designers and the production men. Occasionally it happens that a steel or an alloy is found which in the end-product has properties even better than those originally specified by the designer. Nearly every individual piece is subjected to a three-cornered struggle between the price of the material, the quality desired and the adaptability to commercial fabrication.

Angle Cut-off Saves Many Tons

The cut-off department is equipped with steel cutting band saws, power shears, and high-speed circular saws. When the head of this department receives a work order calling for one hundred Ace pistols, he makes out a requisition for material to present to the man in charge of the inventory.

By HERBERT R. SIMONDS

AN UFACTURE

MASS production was given its initial impetus in America by the manufacturers of small arms, among which the Colt's Patent Fire-arms was a prominent pioneer.

Today, the methods of precise machining employed by the same company in the production of its "Ace" pistols offer valuable suggestions to makers of similar precision products requiring the machining of high grade steels.

This article describes the working of S.A.E. 1350, 1035 and 1085 steels into pistol barrels, receivers and hammers.

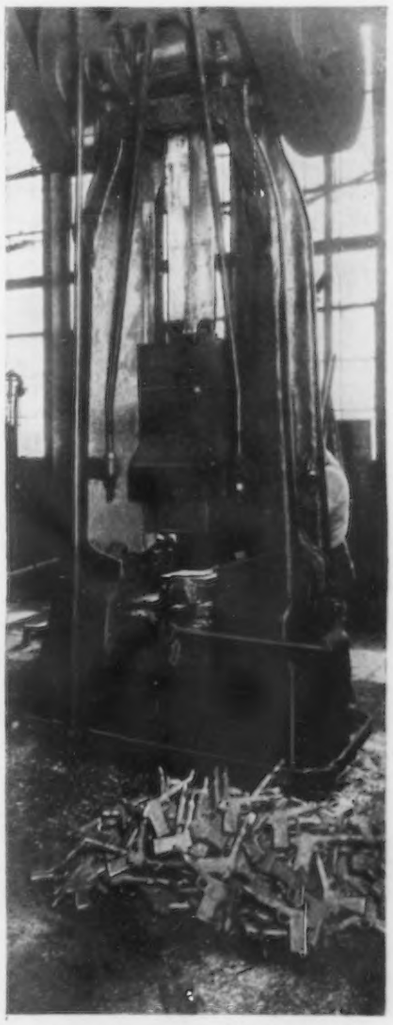
The requisition forms an important record as it is part of the perpetual inventory system. This system is so well organized that errors between the recorded inventory and the actual inventory are very small. Close co-operation between the stores department and other departments reduces shrinkage to a minimum. As far as possible bars are purchased in lengths which are multiples of the lengths of pieces required in manufacture. An example of cooperation between departments which has led to economies is seen in the suggestion by the head of the cut-off department that certain pieces be sawed off at an angle instead of square as was customary. For certain work, corners of two pieces were thus saved which totaled a surprising saving in material by the end of the year.

Many of the pieces coming from the cut-off department go direct to the forge shop and the irregular form of some of the forgings makes a large amount of trimmed scrap unavoidable with the regular square cut bar. This is one case where a slanting or angular cut has proved an economy. Other examples were found in the case of some pieces going direct to the machine shop.

One interesting part of a new Ace pistol is known as the magazine and is cut from flat strip 3⅞ in. wide by 0.025 in. thick. Here also the required pieces are cut on an angle and go first to the press department where they are formed and punched over a mandrel on an intricate forming tool. This leaves the pieces in box-like form with an overlapped joint. The joint is later oxy-acetylene welded. This welding is a semi-automatic operation. The torch is mounted on a feed-head and the piece to be welded is clamped in a special jig built on the side of a lathe frame. This jig is constructed so that it may be revolved through 180 deg., thus making it possible for the operator to load one side while a piece in the other side is being welded. The inside is later broached to give accurate dimensions and smooth surface and the outside is polished. It would seem at first glance that such a piece could be made of tubing, but that type of construction was discarded because of the difficulty of getting a seamless high carbon tube of the required section. Specifications for the magazine call for steel with carbon above 0.40.

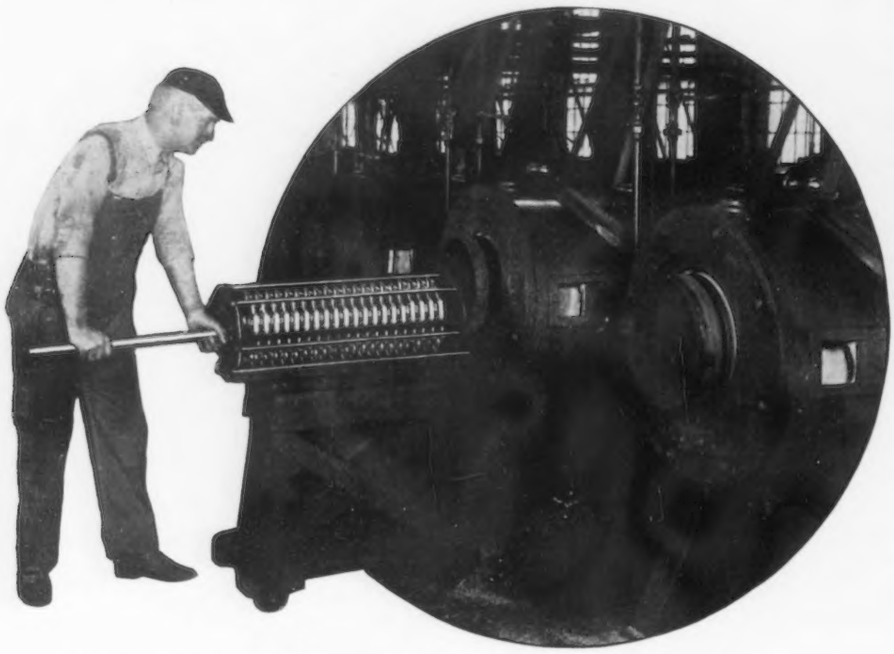
After polishing the magazine is cleaned preparatory to bluing and heat treating. The cleaning is with gasoline, after which the pieces are rubbed by hand with a flannel cloth and a chalk mixture. The bluing operation is performed partly for appearance and partly to give a hard resistant surface. A separate part of the heat treating department which is devoted to bluing has forty gas-fired bluing furnaces. Pieces to be blued are put on racks and then placed in the furnaces and left for two and one-half hours at a temperature of approximately 700 deg. Fahr. Then the pieces are taken off the rack and reversed end for end and again placed in the furnace for a further two and one-half hours at the same temperature. A mixture of bone and charcoal is used in the furnaces and because in summer there is a variation in the pressure of city gas, all gas used, not only for these furnaces but throughout the plant, passes first through a large reservoir tower on the property. This keeps the pressure uniform.

The receiver, which in a sense is the backbone of the pistol, is forged from a bar 6½ in. long by 2½ in. wide and 1 in. thick. The forging is irregular and care is taken in the method of making it to keep the



The bars from which receiver forgings are made are cut at an angle to save material. This shows one of the two hammer operations which produces this forging.

(At top of page). Each pistol is here given a final inspection after which it goes to the target room for actual shooting test.



SPECIALLY built cylindrical racks or jigs are used to hold pistol parts for blue finishing in gas furnaces. Forty of these gas fired bluing furnaces are in operation at the plant.

grain of the steel running parallel to the sides of the piece. The pieces go to the heat treating department for pack hardening and annealing before being sent to the machine shop.

Many Pieces Heat Treated

The heat treating department has modern furnaces, all pyrometer controlled with the usual recording and indicating instruments. One or two electrical furnaces are used for experimental work. Pieces to be heat treated are taken to the furnaces by hand carts built with the floor of the cart level with the furnace floor. Quenching is in oil or water depending upon the result desired, and afterward the pieces go to adjacent furnaces for the draw heat. Some parts are drawn in a cyanide bath. The receivers after heat treating are pickled and then go to the machine shop where the first operation is rough grinding on large Blanchard grinders. Groups of twenty pieces are ground at one time. Afterward the pieces are started at one end of the production row and when they reach the other end they are completely machined.

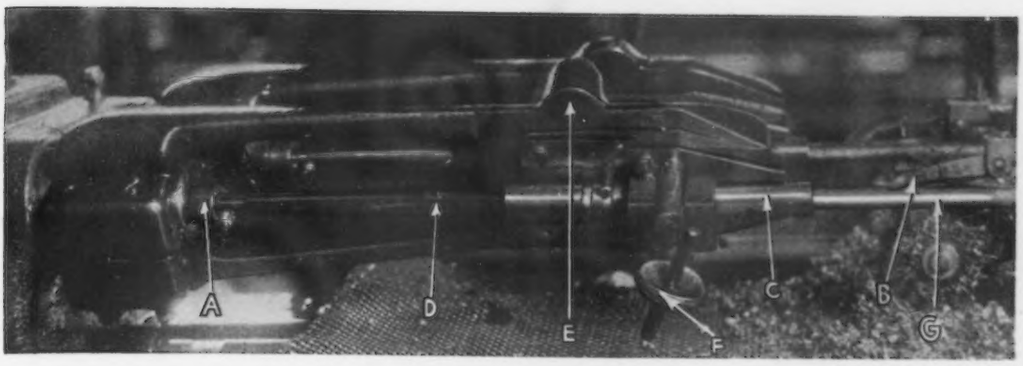
Some of the principal operations are rough milling the top and bottom, drilling holes for the magazine opening, drilling for barrel opening and broaching the magazine opening to square corners. This is an unusual broaching operation because of the accurate dimensions and smooth finish desired. The broaches used are 48 in. long and have 72 teeth which gives a cut of 0.0025 in. per tooth. The next few operations are milling for the main spring housing, milling for the hammer cut and cutting side openings on a Pratt & Whitney profile machine. This machine is of a special design for the work required. It has dished cutters which follow a master form to generate the outline.

The small hammer pieces are forged several at a time under drop hammers.

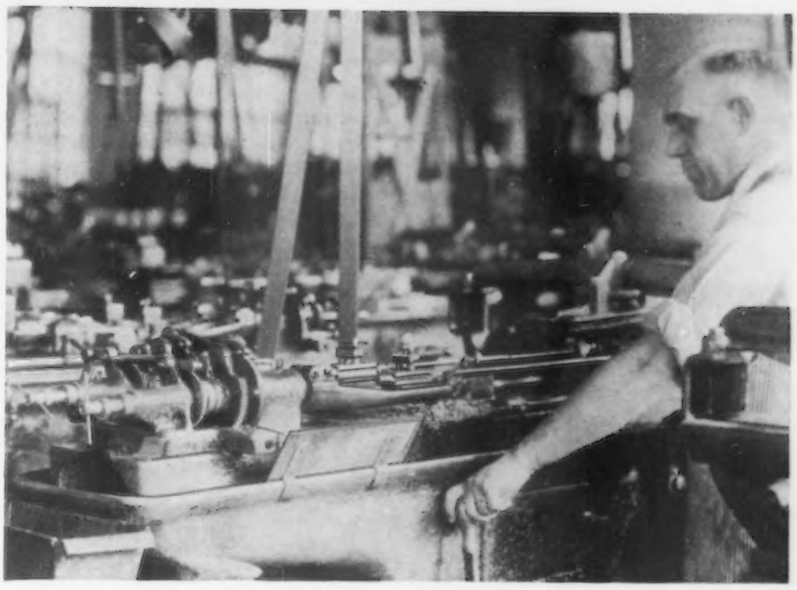
The barrel is machined out of a solid special shaped bar which has the cross-section of a circle with a projecting rib at one point. The full length of the rib is milled off except a small piece which is left for the locking mechanism. The next operation is turning the end, thus making it possible to locate a center for drilling. The drilled hole allows 0.015 in. for reaming, which is a delicate and fussy job and frequently consists of five separate operations. After reaming, the inside of the barrel is lapped with a square tool having a piece of wood attached to one of its sides. This combination is covered with oil and is held within the barrel by a fixture which gives it free play while the barrel revolves. This is continued until checking with plug gages with a tolerance of plus or minus 0.0005 in. indicates that it has reached the proper diameter.

The rifling of the barrel follows the lapping. The grooves of this rifling

This battery of 14 grinding machines is used for finishing Ace and other small arms parts.



THE rifling of the barrels is an important operation. This shows the machine (at right) developed by Colt's engineers after many years' experience. The close view of the rifling of Ace barrels shows one clamped in central position. The cutting tool (D-G) is drawn back and forth through the barrel at the same time that it is revolving on its axis. The disk (B) presses the tool clear of the work on the return stroke.



are 0.0035 in. deep and the combined space occupied by the grooves equals two-thirds of the circumference of the barrel opening. The rifling machines are of the same general design as those originally invented by the engineer when rifle manufacture was first started. They consist essentially of a cutter on a long rod something like a broach cutter, which moves back and forth within the barrel, cutting on the forward stroke and held free by a spring on the return stroke. Coincident with the movement of the cutter the barrel is rotated slightly by means of a cam and rack. The rotation of the barrel is carefully adjusted at the time the work is set up and the movement of the cam is interlocked with the movement of the cutter. Six grooves in all are cut and the indexing from one groove to another is automatic.

Naturally many of the machining operations in connection with the 58 parts entering into an Ace pistol have not even been hinted at and some of these are highly specialized. It took many years, for instance, to perfect the accurate drilling of long rifle barrels and at present, while the drilling is done essentially as a routine job, there are many ticklish points still to be considered. One of these is the sharpening of the drill point. If this point is not accurate to within 0.0005 in. the drill will have a tendency to move slightly out of line in operation. The drilling tool is hollow, made of heavy seamless tubing with a small opening near the cutting point. During drilling, oil under high pressure, sometimes as high as 500 lb. per square inch, is forced through the tubing, out at the point and back along the drill shank to the opening. This oil flowing constantly away from the cutting point along the groove of the shank carries with it the fine steel drillings which if not promptly removed from the cutting end would introduce inaccuracies.

Steel, Twenty Years from Now

By FLOYD W. GRADY

STEEL, twenty years from now will still be steel, but it will be better steel. Many new uses will be found for steel during the next ten years. As lumber grows scarcer and more expensive, the harder the research boys will work to discover new places to use steel instead of wood. Fire hazard alone is enough to justify extra research investments.

Houses are now being built of all steel, and the buckling of brick and the cracking of concrete are even now turning the attention of road engineers to steel for paving.

Stainless steel will be greatly improved. One step forward is going to be the discovery of making steel in colors that will eliminate the present slow and expensive methods of painting the high-priced cars.

The tinny, rumbling metal bodies are rapidly giving way to a sturdy construction minus the objectionable features mentioned.

The time is not far away when basic pig iron will no longer be made in the present type of blast furnace. The stand-still period of making basic iron is about over, and during the next five years the scrapping of blast furnaces that cost millions will seem like a terrific waste of money, but the following five years will prove the wisdom of that seeming extravagance. Shorter cuts to the production of basic iron will prove to be an immense saving.

NEW IDEAS CREATE NEW OUTLETS

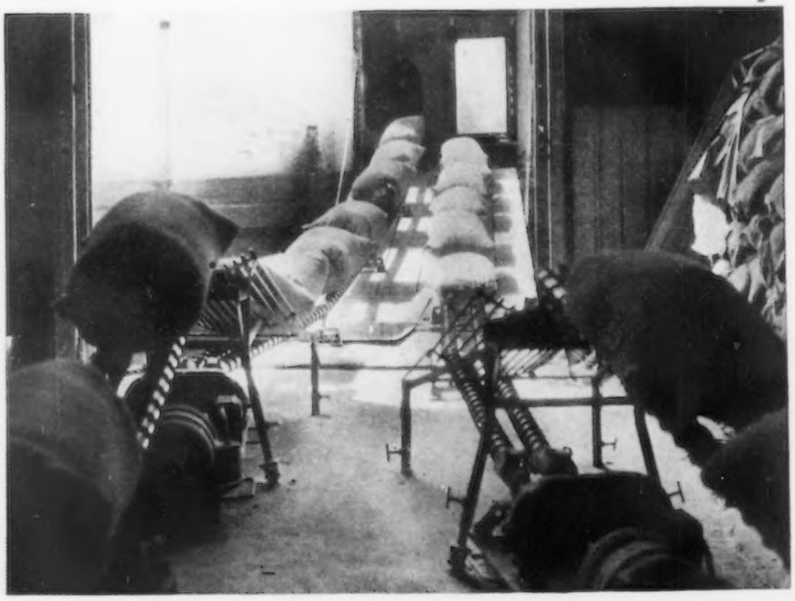
MANUFACTURING facilities have had much publicity, but comparatively little is heard of the new idea facilities of industrial concerns, although new ideas are the life blood of business. Prior to the development of modern business management, organized efforts to develop new ways to net profits were rare. Modern industry goes after new ideas aggressively and in accordance with well-developed plans. Modern industry spends large sums in pure scientific research where the ultimate results are unknown as to specific ideas, but known as to aggregate net profits.

The research departments of the big electrical manufacturers are the best known examples of this method of getting new ideas. Twenty-five per cent of the General Electric Co.'s production in 1929 was of items developed in the previous 10 years through scientific research. Modern business management realizes that it is profitable to search the world for new ideas; instead of being a confession of weakness, this is an indication of strength and open-mindedness.

"We have all of the experience we need," is sometimes urged as a reason why outside sources of experience are not required. One man at work for 20 years in one company has 20 years of experience in the comparatively narrow environment of one company; 100 men at work for 20 years in 100 different companies have 2000 years' experience in different environments. Consider the breadth of ideas to be gathered from the 100 men in comparison with the ideas of the one man! Yet in the past, and, unfortunately in many business concerns today, executives depend on the experience of comparatively few men. What organization can have "all of the experience" it needs in a modern world where life and business are subject to rapid changes? No one man, no one organization, has experience enough to have the best ideas at all times.

SHIPPING fire brick on skids creates a new use for steel strapping.

THE twin - screw type of conveyor, a new idea in conveyors that cuts handling costs.



New Ideas Available in Any Business

Opportunities for making money by cultivating "idea facilities" exist in every business. The maximum results can be obtained only by a well-designed plan of developing ideas from the whole organization and by the use of all available outside sources. They cannot be obtained by depending entirely on executives responsible for certain work within the organization.

Ideas may be produced by any member of an organization. The Newport News Shipbuilding & Dry Dock Co. had a campaign for ideas from all of its employees. The total value of the suggestions received was estimated at $250,000 and included ideas from laborers to the president. However, the most productive source of ideas is a person who has a certain definite type of mind; an active imagination, vision, perspective and courage. In addition, analytical ability and training in scientific methods of collecting and using facts, coupled with wide experience and

FOR PRODUCTION

By H. E. STOCKER

DEPRESSION forces the adoption of new ideas—ideas that effect economies and ideas that create new demands. The development of new ideas, necessary as it is under present conditions, should be a permanent rather than a temporary policy, since the best results accrue from sustained efforts.

Twenty-five per cent of the output of the General Electric Co. in 1929 was in items developed in the previous decade through scientific research. Other examples cited by the author, an industrial engineer, indicate that in small things as well as large undertakings the consistent pursuit of new ideas pays.

contacts in more than one industry, are necessary to the best results.

"A man of vision is one who can free his mind of present-day limitations and look into the future. In what others see as the unexpected today, he sees the accepted truth of tomorrow." Ideas are stimulated by a vision of the future, founded on a knowledge of the trends in the various arts and sciences. If we could see into the future we would know that certain machines and practices now in vogue will be replaced by better machines and practices. It is the modern idea not to accept as final any good idea, but aggressively to work on and search for the new ideas of the future, shortening the time when these better machines and practices are ready to serve industry.

We develop production methods that achieve such remarkable records as reducing process time from two days to two hours. It is equally profitable to reduce the productive time of new ideas. If an idea is recommended that will cut costs, say, $8,000 a year it is best to adopt it immediately, not wait a year. It probably would be good business to spend $2,000 to $4,000 at once to make effective a plan that would yield a net profit in a year of $4,000 to $6,000.

Many Ideas to Be Had at No Cost

New idea facilities should protect against spending time and money developing a new idea on which much time and money has been expended by some one else. This requires wide sources of information. Some ideas that reduce costs and improve service are available at practically no cost, the development work having been done by another organization, which is willing to give others the benefit of its experience. Other ideas cost more to acquire, but money applied to this purpose in accordance with a well defined plan has proved to be productive of handsome profit.

Some companies are hampering the revival of their business by restricting the initiative of their employees and by this means preventing the birth of many profitable ideas and making the work less interesting. Organized effort to stimulate, rather than to restrict, the creation of new ideas is a modern way to profit.

No one has a monopoly on ideas—they may originate with the office boy or with the president, or, as often happens, with some one outside the organization. Manufacturers of household products are realizing that housewives are an excellent source of new ideas in the design and remodeling of their products. Some manufacturers have women in their organization whose duties are the getting of ideas from housewives.

Examples of Savings from Ideas

A salesman of a steel strapping company was cooperating with the author in developing skid shipping on a steamship company's dock. A ship was discharging lumber piece by piece. Piece by piece the lumber was made into a slingload in the hold of the ship and then hoisted to the car on the wharf, where it was again handled. The salesman, being materials-handling conscious and familiar with the fundamental principles of materials handling that are applicable in all industries, saw this method as wasteful and obsolete. As a result of his idea, experiments were started in shipping lumber in packages held together with steel strapping, which method now bids fair to produce large economies and other advantages for lumber companies, steamship companies and dealers.

Upon taking over the management of a company, one executive elimi-

A steel salesman conceived the idea of bundling lumber with steel strapping, thereby greatly facilitating the loading and unloading of vessels.

nated an entirely useless operation in the office that had been going on for years. Certain documents were issued and sent to shippers, who, in turn handed them back to the dock force of the transportation company. The executive could not find sufficient reason for their existence and eliminated them. The result? A saving in stationery to the steamship company, better service and less expense to the shippers. The reason for this waste of money, material, time and effort? "Why, we have always done it that way." The direct savings from that "idea" paid the executive's salary for the year.

At another time, while searching for new ideas, this executive thought of the unused capacity in a freight ship for carrying cargo oil in bulk, and increased his company's profits $25,000 a year.

An employee of a steamship company at Los Angeles conceived the idea of a new type of rope sling which saves in rope replacement in handling bags of coffee and other bagged cargo. The idea was developed in the cargo-handling gear shop and a new type of sling evolved that has resulted in large savings each year.

Shipping firebrick on skid platforms is an idea that has cut handling costs and prevented damage to brick, and, because of avoidance of damage, has increased sales for the brick manufacturers and has increased traffic for the transportation company that conceived the idea.

An engineer at a sugar refinery had an idea about applying the twin screw type of conveyor to the handling of bags. From his idea grew the successful screw-type conveyor of today which handles many commodities packed in bags.

A railroad by the use of this conveyor conserved its warehouse space and cut the cost of piling bags of refined sugar.

Organized efforts to find new products are often the way to increase the use of productive capacity of a plant.

New Processes Applied to Old Products

Besides developing new products, there is profit in the application of old products to new processes. The photoelectric tube is finding wider application, reducing costs and improving quality. The photoelectric cell has been applied in handling mail recently in a postal railroad terminal. The bags are dropped from an electric tramrail at the proper car by a shaft of light from the car acting on a photoelectric cell attached to the tramrail. Undoubtedly there are many other applications of this remarkable development of pure science that will produce profits for depressed industries by reduction of costs and will increase the market for photoelectric cells.

In these days of depression, competition and unemployment, the idea-providing machinery of a business is of greater importance than at any other time. Business men should be sure that it is up to the minute and capable of producing the best results possible. Any reasonable expense is justified for a well-planned new idea facility. Today, with inadequate or non-existent profits, it is vital to know that new idea facilities are adequate and functioning at their best.

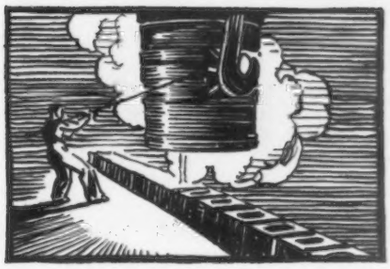
Age Hardening in Carbon Steel

THE influence of natural and artificial aging on the hardness, toughness and dimensions of cylindrical specimens 2.36 in. in length by 0.275 in. in diameter of a steel analyzing 0.98 C, 0.19 Si, 0.43 Mn, 0.026 P and 0.01 S has been investigated by S. Steinberg and W. Subow (*Stahl und Eisen*, July 16, 1931). The test pieces were hardened by quenching in water from 1380 deg. F. Rockwell hardness was measured, and the toughness was determined by static bend tests under a Brinell press. Results are shown in the table.

Natural aging of water-quenched steel proceeds slowly with gradual increase in hardness and toughness. The hardness passes through maxima after 3 days of aging at 167 deg., 3 hr. at 212 deg., and ½ hr. at 257 deg. Toughness increased on aging in every instance, and also the length of the test pieces decreased, approaching as a limit 40 per cent of the elongation which occurred in hardening. The microstructure was appreciably affected by 3 hr. treatment at 257 deg. F., etching with nitric or picric acid producing dark colors more rapidly than in the quenched specimens.

Since the increase in hardness observed on aging at each temperature is accompanied by contraction in length, the change cannot be explained on the basis of the austenite-martensite transformation. The decomposition of the residual austenite is still very slow at 300 deg. F. Hence the increased hardness must be due to an aging phenomenon of martensite. The fact that the contraction in length tends toward a limit appears to indicate that this change is connected with the relief of internal strain. According to these views, the tetragonal form of martensite observed by G. Kurdjumow to disappear at 212 to 257 deg. F. is not a new type of crystal but represents strained cubic martensite. For practical purposes, a half-hour treatment at 250 deg. F. is recommended for water-quenched carbon steel, so as to increase its hardness and toughness and reduce the internal stresses.

Aging Time	Contraction, Per Cent of Length	Contraction, Per Cent of Elongation in Hardening	Hardness		Toughness, Lb. per Sq. In. (Bend Test)
			Initial	After Aging	
1.—*Natural aging*					
1 month	0.03	10.0	65	66.3	.....
2½ months	0.04	15.0	65	66.3	220,000
5 months	0.04	15.4	65	67.0	227,000
2.—*Aging at 167 deg. F.*					
5 min.	0.004	1.6	65	65.5	206,000
10 min.	0.008	2.4	65	66.0	203,000
30 min.	0.013	5.0	65	66.6	209,000
72 hr.	0.090	30.0	65	66.0	241,000
3.—*Aging at 212 deg. F.*					
5 min.	0.025	8.3	65	67.0	248,000
10 min.	0.033	10.3	65	67.4	258,000
30 min.	0.050	14.3	65	67.3	258,000
1 hr.	0.058	17.5	65	67.3	270,000
3 hr.	0.066	18.6	65	66.5	301,000
72 hr.	0.124	39.5	65	63.5	310,000
4.—*Aging at 257 deg. F.*					
1 min.	0.030	10.5	65	66.5	234,000
5 min.	0.090	32.9	65	66.5	258,000
30 min.	0.116	38.3	65	66.0	278,000
3 hr.	0.116	38.8	65	64.5	361,000
72 hr	0.124	39.5	65	62.5	454,000



CHROME-TUNGSTEN STEEL FOR HIGH TEMPERATURE USE

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SOME new developments in alloy steels for high-temperature, high-pressure service were outlined at a recent meeting of the Hartford chapter of the American Society for Steel Treating by V. T. Malcolm, metallurgical engineer, Chapman Valve Co., Indian Orchard, Mass. He particularly recommended chrome-tungsten steel for such service.

Mr. Malcolm said that the ideal alloy steel for high-temperature service would show complete resistance to abrasion, corrosion and oxidation. A minimum requirement of a steel for such use is the ability to carry loads continuously without appreciable distortion. Short-time tests at temperatures over 700 deg. F. are not a true test of this ability, as they measure principally elastic deformation and not plastic yield, which is a large factor at the higher temperatures. Creep strength, expressed in terms of the load which can be carried at a definite temperature without distorting over 1 per cent in 10,000 or 100,000 hr., is the measure used to determine the ability of the alloy to withstand high-temperature service. Thermal expansion, thermal conductivity, oxidation, and erosion are also properties which must be known. Toughness, as well as hardness, is required for wear resistance.

Limitations of Some Steels

Carbon steels are not suitable for temperatures over 700 deg. F. Nickel-chrome steels can be used up to 900 deg.; 18 per cent chrome steels show grain growth above 900 deg.; 18 and 8 rustless steels develop intercrystalline brittleness between 900 and 1200 deg. and, if they fail, go without warning; 4 to 6 per cent chrome steels with molybdenum show banding, segregation of carbides, scaling and decarburization, giving reduced wear resistance.

Chromium and tungsten strengthen steel below the equi-cohesive temperature, assist the work of the carbon and reduce the amount of occluded gas, giving a finer and denser structure. Chromium gives a very stable carbide which does not agglomerate, lowers the carbon of the eutectoid, dissolves in iron in all proportions, restrains plastic flow, and produces carbides to prevent intercrystalline slippage. Tungsten increases the strength even in the as cast or rolled condition, inhibits grain growth, requires high draw-back temperatures which allow higher operating temperatures, and adds to the impact values.

The importance of accurate extensometers and tests simulating operating conditions was stressed by Mr. Malcolm. Curves plotted by two extensometers attached to the same test piece revealed that the one reading to two millionths of an inch had recorded the proportional limit of the test piece before the other, reading to one thousandth of an inch, had plotted a single point at 1200 deg. F.

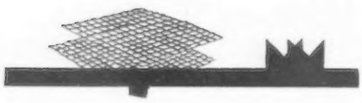
Mr. Malcolm showed slides of parts which had failed in high-temperature service. A rustless steel part of 360 Brinell failed by seizing. An 18 and 8 rustless superheater let go without warning after 18,000 hr. of service. A test piece of this showed 4 per cent elongation, 7 ft.-lb. Charpy impact and 285 Brinell, as against a test taken before service showing high elongation, high impact and 165 Brinell. An 18 per cent chrome steel forging failed without warning and a test piece showed 2 per cent elongation against a value of 18 to 20 per cent determined before the forging was put into service.

A Chrome-Tungsten Steel Favored

Mr. Malcolm described a steel with an analysis of carbon 0.15 to 0.25 per cent, manganese 0.55, silicon 0.50, sulphur and phosphorus 0.05 maximum, chromium 4.5 to 6.5, tungsten 0.75 to 1 per cent which will give a tensile strength of 120,000 lb. per sq. in., yield point 100,000 lb. per sq. in., an elongation in 2 in. of 20 per cent and reduction in area of 55 per cent. Quenched from 1400 deg. F., it will show 386 Brinell and quenched from 1600 deg. F., 428 Brinell. At 270 Brinell it machines as readily as a nickel-chrome steel does at 200 Brinell. Its coefficient of expansion is close to that of carbon steel. It resists corrosion by West Texas crude oil and is the same in this respect as rustless steel. In scale resistance, as in strength, it shows an advantage of about 400 deg. F., over carbon steel. A carbon steel, at 1000 deg. F., showed creep strength of 1 per cent in 10,000 hr. under 800 lb. per sq. in. loading against a value of 80,000 lb. per sq. in. for the chrome-tungsten steel. A cast chrome-tungsten steel showed 10 per cent better creep strength than in the rolled or forged condition. This alloy can be used at temperatures up to 1400 deg. F. It shows slight intercrystalline brittleness at 1600 deg. F.

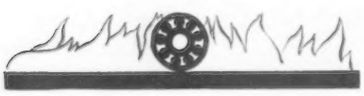
Discussion brought out the information that the carbon is kept low in the chrome-tungsten steel to increase corrosion resistance, prevent tenderness, and to facilitate removal of risers. Chrome-tungsten steel finds economical use at temperatures over 800 deg. F. The Germans have tried adding 7 per cent tungsten or 0.7 per cent titanium to 18 and 8 rustless to prevent intercrystalline brittleness. Failure of 18 and 8 rustless is probably due to incomplete austenitic structure and incomplete diffusion of carbides. At 280 to 320 Brinell, chrome-tungsten forgings or bar stock thread satisfactorily. This steel nitrides exceptionally well. A 20 per cent nickel, 8 per cent chrome steel used for high-temperature service has a very high coefficient of expansion. Monel metal, used for valve seat rings at 800 deg. F., dropped out due to the different coefficient of expansion from the valve material.

MONEY SAVING IDEAS



Nickel Wire Screens for Nitriding

IT is generally considered advisable to separate steel products when packing them in containers for nitriding. One manufacturer suggests the use of nickel wire screens to accomplish this separation. He says in his plant he gives the packers an ample supply of such screens of various sizes, and in this way he has been able to cut down the time of packing of one of his standard nitriding boxes by about 20 minutes. He uses standard "V" blocks made of nickel steel for supporting long shafts and other cylindrical parts to prevent sagging or warping during nitriding.

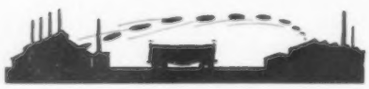


Jigs Reduce Heat Warp

THE tendency to warp in the case of thin steel parts under heat treatment is a constant difficulty in a plant producing accurately machined products such as ball bearing races. One manufacturer of such races has largely overcome warping during heat treatment by the use of jigs. These jigs are slightly conical in shape and are provided with long handles. Their use is simple and effective. The bearing races are spread out in a single layer over the furnace hearth. The operator extends his long-handled jig into the furnace, drops it in place into one of the races, and by this means lifts the race, removes it from the furnace and lets it down in an adjacent oil quenching tank. This tank is deep enough to take the full length of the jig handle, which by means of a hooked end is hung over the edge of the tank. After quenching, the pieces are removed from the jigs by merely tapping the jigs against the side of a tote box.

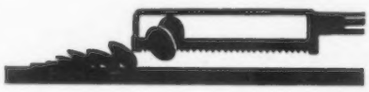
Lubricators Replace Oily Rags

OIL soaked rags and other similar means of lubricating strip steel which is being fed into a stamping or forming machine may be eliminated usually with considerable advantage by installing an automatic lubricator. Several types of such lubricators are available. They are often mounted on the frame of the press above the work and are actuated by each press operation. The lubricant is applied in a spray to the strip just ahead of the dies. Those who use such lubricators, claim that the lubricant and strip are cleaner and that the life of the die is correspondingly greater than when open oil soaked waste and rags are used.



Scrap Re-Working Cuts Freight Bills

FREIGHT is paid both ways on a good deal of material which leaves producing centers as finished steel and returns to these same centers as scrap. This double freight has been particularly evident in the case of New England metal stamping works, where it often happens that skeleton scrap representing sizable proportions of the weight of the outward shipment must be returned to Pittsburgh for its best market. To eliminate this double transportation of heavy material, manufacturers who make nothing but sheet steel blanks have located close to steel works, and they are finding success in supplying blanks of any shape or character to stamping companies in various parts of the country. This not only eliminates the double freight on scrap, but it reduces handling and cuts out the first operation at the stamping plant.



Saws Saved Him Dollars

IT often happens that small steel products are best produced from disks which previously have been cut from bars. Such disks may be successfully cut by motor driven reciprocating saws. One manufacturer uses such saws in preference to band saws because he finds the initial equipment less expensive and more compact. He has a cut-off department with 76 reciprocating saws in operation cutting disks from bars ranging from 3 in. to 6 in. in diameter. These saws are all provided with automatic shut-off switches and one operator looks after some 10 to 15 saws. At night a maintenance crew replaces the saws and makes any necessary adjustments. In this particular case the first machining operation on the disks requires that the sides of the disk be parallel and at right angles to the axis of the original bar. To secure such accuracy the bars must be perfectly straight and the proper lubrication must be used.

FOR WORKS MANAGERS

Manganese Steel Rivets

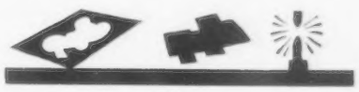
BOILER manufacturers may do well to try manganese steel rivets where high joint strength is desired. Such rivets were used for the lower chord of the Kill van Kull bridge, recently completed between New Jersey and Staten Island, New York. Under test, both single and double tier rivet connections gave a strength for joints using manganese steel rivets more than 60 per cent higher than similar joints using carbon steel rivets.

Thin Forgings Stay Straight

THE manufacturer of small thin forgings has corrected warping during heat treatment by the simple process of leaving the flash on and trimming with cold trimming dies afterward. Trimming the hardened forgings is a little severe on the trimming dies but the advantage of the method overbalances this difficulty.

One Hammer: Two Furnaces

IN a large cutlery plant the manager has increased production by supplying each hammer operator with two heating furnaces and then providing a furnace man to assist several of these operators. Under the new plan while a group of bars in one furnace is being forged, the furnace man places a second group in a second furnace and brings it up to forging temperature. In this way when the first group has been finished the second group is ready to be used without any loss of operator's time.



Several Ways to Save Scrap in Blanking

WHEN rectangular steel sheets are used for large irregular stampings, the scrap resulting from the first blanking operation is often disproportionately high. In some cases this excessive scrap may be reduced by using very large sheets and cutting several irregular blanks from these in an operation preceding the usual first blanking operation. Another method which is being used successfully by one manufacturer is to flash weld, edge to edge, two or more small rectangular sheets to form a large sheet of an irregular outline approximating the form of the stamping. The sheets to be thus welded are held accurately in butt position slightly separated by a space which is a little wider at one end than at the other. A low voltage, high amperage current, is then switched on and a flash starting at the narrow end quickly spreads throughout the joint. After just the right time interval, the current is turned off and the sheets are forced together with a quick positive motion which spreads the metal of initial contact to form beads at either side. This brings together under the beads, the soft unembrittled metal just back of the high heat zone. The beads are later removed by drawing the sheets between shear dies.

New Insulating Brick Saves Space

THE plant manager who wishes to save space in the construction of a new furnace may profit by investigating the new insulating bricks which have recently appeared on the market. One such brick has four times the insulating value of common fire brick. That is, the heat flow of a 9 in. wall of insulating brick is equal to a 36 in. wall of fire brick. In some types of furnace this means a weight ratio for the insulating brick of 1 to 16, and in addition it means a floor space saving of from 20 to 35 per cent. In addition, there is the question of fuel economy, which is very important on intermittent work.

Reducing Atmosphere Reduced Cost

A SIMPLE means of maintaining a reducing atmosphere in a hardening furnace has been devised by a manufacturer of universal joints. He has simply installed a metal chute extending from the discharge end of a continuous heat treating belt type furnace so that the lower end of the chute is below the surface of a quenching tank. The pieces leave the belt at about 1600 deg. Fahr., and drop into a 14-ft. deep quenching tank into pockets of a conveyor extending from the bottom of the tank up to a discharge table. The depth of the tank and the speed of the conveyor are arranged to give a definite time interval in the quenching tank.

ELECTRICALLY HEATED GALVAN

By R. M. Cherry,
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General Electric Co.,
Schenectady, N. Y.

CONSISTING essentially of a steel tank placed in a brick setting, the galvanizing furnace has to a certain extent been considered as a necessary evil. Along with many others, this process of galvanizing is beginning to receive careful consideration, the ultimate idea being to modernize.

Any manufacturer of galvanized products is interested in producing an article of high quality and low overall cost, and to produce it under the best possible working conditions.

Many variables, of course, must be controlled to obtain high quality, some of which are: pickling, zinc and temperature. Probably the most important of these variables is the temperature. If the variability of this can be eliminated, or materially reduced, then a great step has been made toward raising the quality and lowering the cost.

Electric heat eliminates the control of temperature from the list of variables, since the heating units in the electric furnace can be placed and distributed in the heating chamber as desired. Also, the temperature of the heat source, (i.e., of the ribbon resistor) is only a few degrees above the heating chamber temperature. The desirability of electric heat is unquestioned today except from the standpoint of cost.

When considering the cost of the fuel-fired furnace, the effect of the heat source on the overall cost of the product must be taken into consideration. On a strictly B.t.u. basis, there is no question that electric heat is a higher-priced heat source than most of the available fuels.

On the B.t.u. basis alone, certainly the decision would be to use soft coal in the majority of cases, since soft coal has a lower cost per B.t.u. than practically any other available fuel. But the use of soft coal as a source of heat for hot-dip galvanizing has practically been eliminated, for other factors than strictly B.t.u. cost enter into the overall cost of galvanizing.

Some of the major items affecting the cost of the hot galvanized product are:

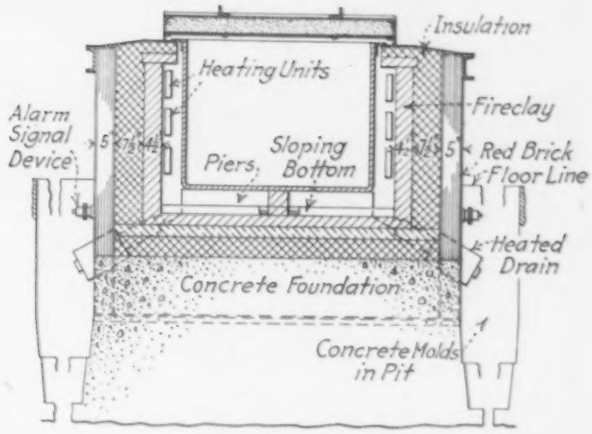
1. Temperature control.
2. Zinc consumption and dross formation.
3. Labor.
4. Maintenance.
5. Production, including shutdowns.
6. Inspection.

Temperature control affects the other items of cost. For each product, there is a proper temperature to secure the best results and, the closer the ideal temperature conditions can be maintained, the higher the quality of the product.

ELECTRIC furnace for galvanizing miscellaneous small parts. Rated: 100 kw., 220 volts, 3-phase. Installed at the Wrought Iron Co. of America, Lebanon, Pa.

IZING FURNACE

TEMPERATURE control is emphasized as of prime importance in electrically heated furnaces for galvanizing baths. The efficiency of galvanizing depends decidedly upon keeping the temperature within a certain rather limited range. If it goes too high the pot burns out at a greatly accelerated rate. If it goes too low the zinc is not sufficiently fluid for proper work.



OUTLINE of a typical construction for an electric galvanizing furnace.

Zinc consumption will vary from 50 to 300 lb. for each ton of steel galvanized, depending upon the type of work being galvanized. A few degrees change in temperature affects the thickness and quality of coating. The amount of dross formed, also, is largely dependent upon the accuracy of temperature control and on the elimination of hot spots that usually occur in fuel-fired furnaces.

The item of maintenance includes not only the replacement or repair of tank, but also the expense involved in rebuilding the brick setting and cleaning out the zinc after a tank failure.

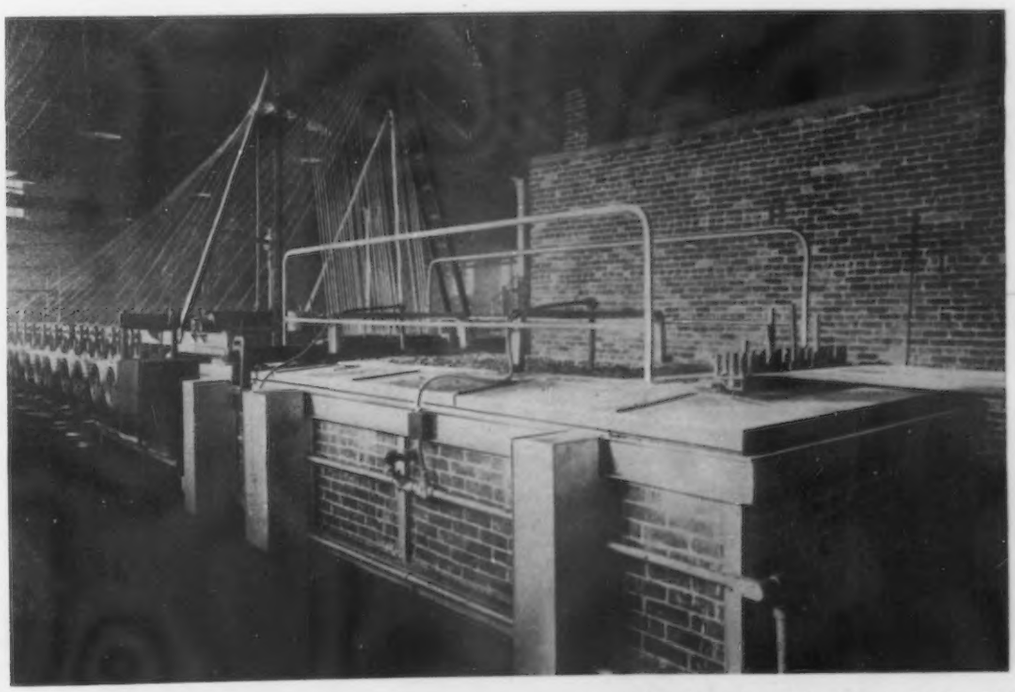
One illustration shows an installation of a small electric galvanizing furnace, the tank of which, inside, is 28 in. wide, 38 in. deep, 48 in. long. Its rating is 100 kw., 220 volts, 3-phase. This furnace has been in operation approximately 18 months and the user is now installing a second electric furnace which measures inside 36 in. wide, 36 in. deep and 12 ft. long, and has a rating of 220 kw., 460 volts, 3-phase.

That this user has found the first installation satisfactory, from the standpoints of both quality and operating cost, is indicated by the installation of the second equipment. An installation of a larger electric galvanizing furnace for miscellaneous parts appears in a second picture.

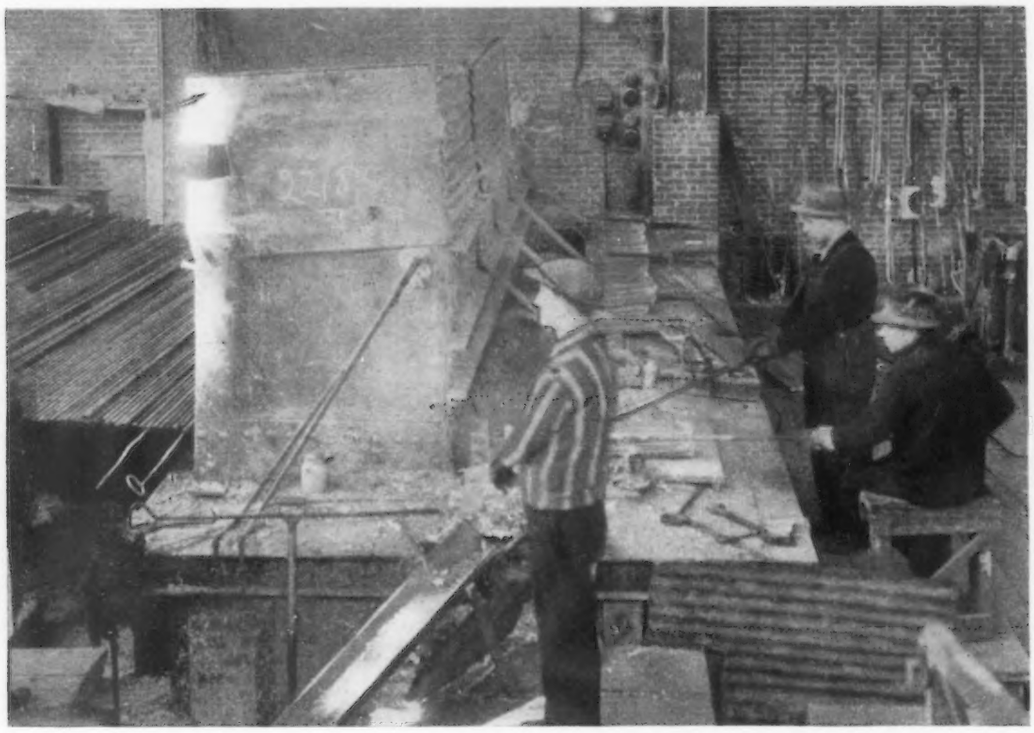
Galvanizing Pipes

Another interesting installation is that for galvanizing puddled iron pipe at the Reading Iron Co., Reading, Pa. One illustration is an end-view showing the inclined charging platform and discharge end. The furnace has inside tank dimensions of 43 in. wide, 49 in. deep, 25 ft. long, and a total rating of 630 kw., 220 volts, 3-phase.

Pipes to be galvanized enter at one side and are pushed down by means of air-operated plungers. They pass across the tank near the bottom, up the discharge side, and out at one end of the discharge side. As this gives in effect a continuous operation, the heat required is greater on the incoming side. For this reason, the 630 kw. input is divided into three separately controlled circuits around the tank, with the highest rating circuit at the top of the entrance side. This layout provides for a maximum production with the given rating.



ELECTRIC wire galvanizing furnace. Rated: 204 kw., 220 volts, 3-phase. Built by Canadian General Electric Co. for Frost Steel & Wire Co., Hamilton, Ont.



ELECTRIC furnace for galvanizing puddled iron pipe at the Reading Iron Co., Reading, Pa. Rated: 630 kw., 220 volts, 3-phase.

This equipment was designed for a maximum production of 6½ tons of pipe an hour, and has galvanized as high as 7 tons of pipe an hour on a continuous run. The table gives results from five consecutive months' operation of this furnace.

It should be noted that the average operating time was 182.3 hr. a month. If this furnace were run 24 hr. a day, 5½ days a week, giving a total of 520 hours a month, the energy consumption in kwhr. per ton would of course be lower. Since the zinc is held at a temperature slightly below the operating temperature during all the idle periods, the only heat required for the additional operating hours is that heat absorbed by the additional work, heat required to melt the additional zinc, and the difference in stand-by and operating losses. These three items can be calculated accurately.

With an average production of 4.67 tons an hour, operating 520 hr. a month, (2430 tons a month), the consumption is estimated at 114 kwhr. for each ton of pipe galvanized.

If this average production should be increased, say, to 6 tons an hour, operating time 520 hr. a month (3120 tons a month), the consumption is estimated at 104 kwhr. a ton. These figures, also, include the heat losses during all standby periods.

Wire Galvanizing

An installation of an electrically heated wire-galvanizing furnace in Canada is shown. This furnace has a tank 48 in. wide, 40 in. deep and 14 ft. long, rated 204 kw., 220 volts, 3-phase. The heating units are divided into two separately controlled circuits in the length of the heating chamber. The surface of the zinc, except of course where the wire enters and leaves the bath, is covered with approximately 3 in. of insulating material, thereby reducing the heat losses to a minimum.

Operating results of this installation have been remarkable, particularly in regard to power consumption, saving in dross and the quality of galvanized wire produced. The table gives operating results of four consecutive weeks. The wire sizes were Nos. 9, 12 and 13, and operating temperature, 865 deg. F.

Attention is called to the average consumption of 106.5 kwhr. each ton of wire galvanized and the average zinc consumption of 67.7 lb. each ton of wire. These results are the overall figures, including the standby periods and for varying production.

No dross was removed during this four weeks' operating period. In fact, the tank was not drossed until the furnace had been in operation about four months, and then only 1000 lb. of dross was removed. During this four months' period, over 2000 tons of wire was galvanized.

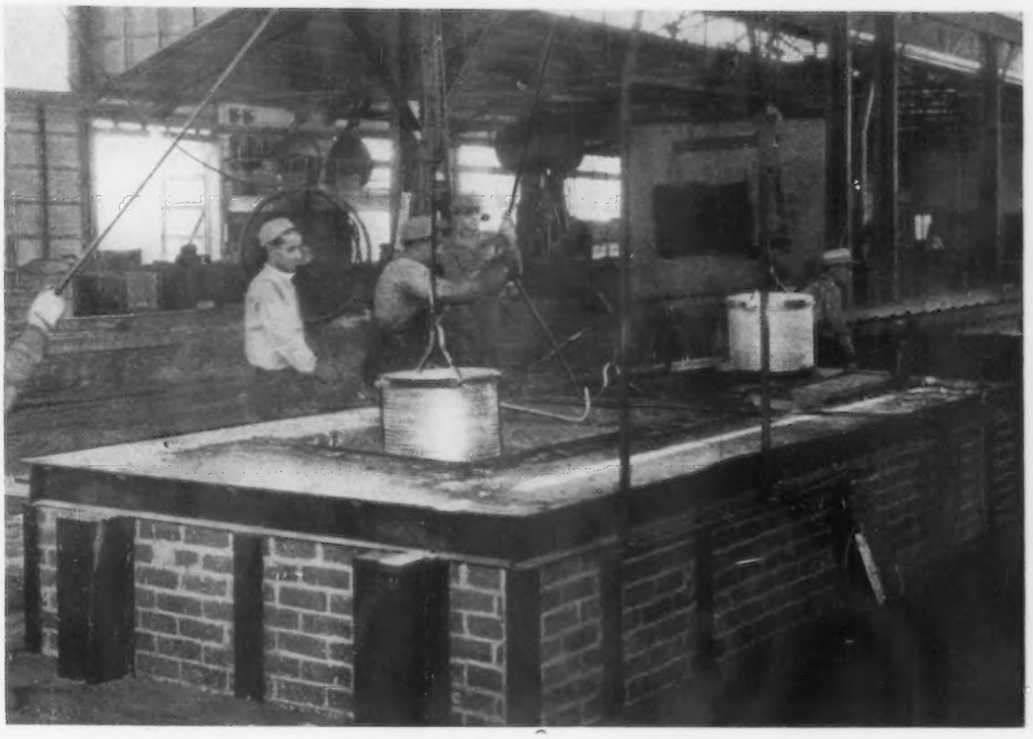
The seemingly low dross in the electric furnace is due primarily to two things; first, accurate temperature control; second, well insulated bath. Zinc temperatures in this electric wire-galvanizing furnace vary between 855 and 865 deg. F., a 10 deg. range.

In the event of production suddenly dropping from 100 per cent to 0, the over-shoot in temperature in an electric galvanizing furnace is appreciably less than will be found in galvanizing furnaces fired by other fuels. In the case of the electric galvanizing furnace at a wire-manufacturing plant, the maximum over-shoot recorded under the above conditions did not exceed 10 deg. F.

Any galvanizing tank will ultimately fail. In the fuel-fired furnace, the tank failure is largely due to exces-

Operation of Pipe-Galvanizing Furnace

Month	Operating Hours	Total Tons of Pipe	Total Power Consumed, Kwhr.	Kwhr. per Ton of Pipe	Average Production Hourly in Tons
1	168.25	786.2	137,000	174	4.67
2	116.0	584.4	96,000	164	5.03
3	239.0	1,032.5	157,200	152	4.35
4	119.5	508.9	101,800	200	4.26
5	268.75	1,340.2	189,500	141	5.00
Average	182.3	850.4	136,300	160	4.67



ELECTRIC furnace for galvanizing miscellaneous parts. Rated: 200 kw., 220 volts, 3-phase. Tank is 3 by 12 ft., 42 in. deep. Installed at the Joslyn Co. of California, Los Angeles.

sive temperature, usually at localized spots. The fuel-fired furnace has a high-temperature heat source (flame temperature) and while baffles, etc., are commonly used to even out these hot spots (burner location), they are not uniformly eliminated.

Heating units in the electric furnace are mounted on the chamber walls and distributed as desired, both in the length of the heating chamber and in the height of the walls, thus definitely eliminating hot spots. The value of accurate temperature control as it affects the life of the tank is shown by diagram. These curves show the rate of solubility of iron in zinc at various temperatures, and for three steels of different (but unknown) chemical analyses.

For the usual temperature range for galvanizing (825 to 875 deg. F.) the rate of solubility is practically constant and the analysis of the steel has little effect. If the temperature is permitted to reach, say, 950 deg. F. at any part of the tank, the rate of solubility may be as high as 8 to 20 times that at 850 deg. F. These curves indicate the advantage of the accurate control of temperature and even heat distribution obtained in the electric furnace. They were taken from tests made by E. Diegel, of Julius Pintsch Corpn., and reported in *Zeitschrift des Vereines deutscher Ingenieure.*

Although the rate of solubility of the steel tank in the zinc is very low in the electric furnace, the tank will fail in time. In the electric furnace, there is practically no oxidation of the outside of the tank, which is exposed to the heating chamber. Tanks which have been in operation over a year have been examined and the original chalk or paint marks put on the outside of the tanks by the makers were still clearly visible.

In addition to the cost of replacing or repairing a tank, the items of rebuilding or repairing the furnace brickwork, clearing out of the zinc and the loss of production may total a great deal more than the cost of a new tank.

Electric Furnace for Hot-Dip Galvanizing

General construction of the electric galvanizing furnace is shown in a drawing. The heating units are mounted on the two side walls and are divided into one or more circuits, depending upon the size of tank, the production and the flow of work through the tank. The bottom heating units are kept above the dross line of the tank, so as not to drive heat through the dross, which is not a good heat conductor.

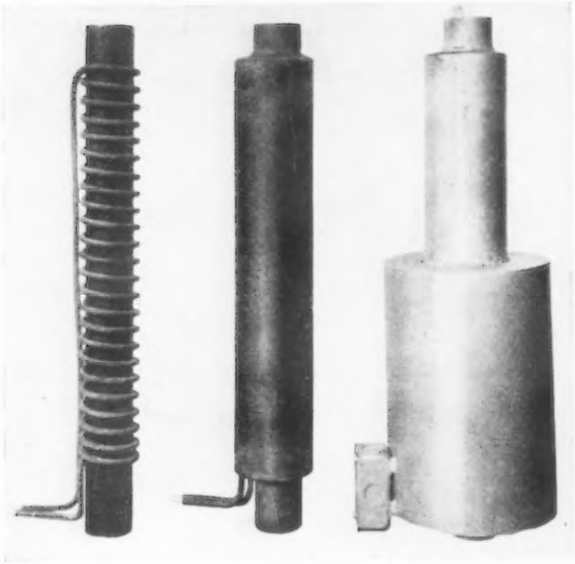
The bottom brickwork is sloped to several low points or pockets (the number depending upon the size of the furnace). At these pockets are located alarm signal devices and electrically-heated drain tubes. The alarm device consists of two heat-resisting alloy wires mounted in alundum compound insulators. The ends of the two wires are separated, so that the circuit is normally open.

Usually, when a leak occurs, it is relatively small and the zinc will be conducted by the sloping bottom to the nearest pocket, where the zinc, coming into contact with the end of the signal device, completes the alarm circuit. A signal light or alarm bell may be used to notify the operator that a leak has occurred. At the same time that the signal bell, or light, is operated, the alarm device also closes a separate circuit through proper control panels, throwing power on the electrically-heated drain tubes.

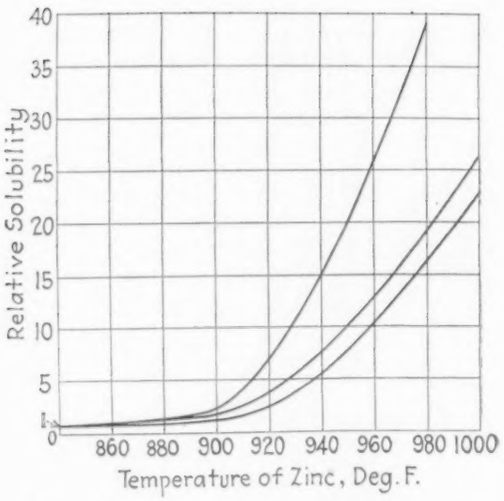
A typical electrically-heated drain tube is shown. These drain tubes are built into the furnace wall and are inclined so as readily to drain out the zinc from the furnace chamber into molds provided in a pit on the

Operation of Wire-Galvanizing Furnace

Week	Operating Hours	Standby Hours	Tons of Wire	Total Zinc Used, Lb.	Total Kwhr.	Kwhr. per Ton of Wire	Zinc Used per Ton of Wire, Lb.
1	129.5	38.5	143.54	8,748	16,749	116.6	61.0
2	129.5	38.5	170.68	10,618	17,266	101.2	62.0
3	127.0	41.0	185.58	14,117	19,349	104.3	76.0
4	129.5	38.5	205.2	14,305	21,366	104.1	70.0
Average	128.9	39.1	176.25	11,947	18,682	106.5	67.7



Construction of an electrically heated drain tube, showing three stages in the assembly.



Relative solubility of iron in zinc of three different steels, showing low losses below 900 deg. F.

side of the furnace. As the molten zinc nears the outside of the drain tube, it will gradually solidify and fill the drain, unless the drain is heated. For this reason a standard sheath-wire heating unit is placed around each drain tube and the entire device, including tube heating unit, is properly insulated. The rating of this heating unit is such that it will maintain the drain tube at a temperature above the melting point of zinc.

These protective devices provide for lower maintenance and lower loss in production in case of tank failure.

Steel Garage Simulates Frame Exterior

USING a steel section, which when applied to steel framework, appears to be clapboard siding, the Metal Forming Corpn., Elkhart, Ind., has put up a two-car garage, illustrated herewith. The picture was taken before the large doors were installed.

In the interior view the construction is readily apparent, consisting of steel studs and rafters with diagonal bracing, and with the rolled siding applied directly to both the vertical walls and the roof. In the case of the roof this obviates the need for purlins.

There is no combustible material of any sort in this building. The construction lends itself to any of the usual forms of roof—straight gable, side gable or hip. It can be provided readily in any one of a number of standard sizes.

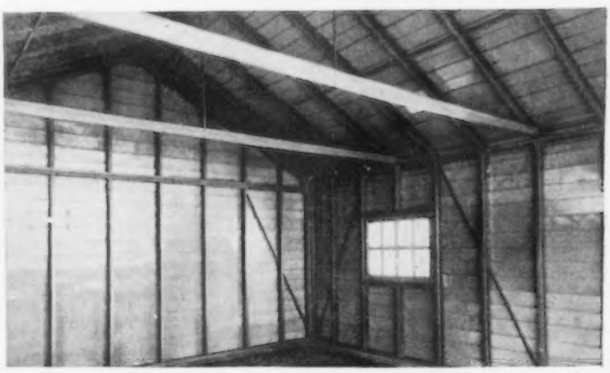
Erection of this building took two men about five hours. The material was supplied to the job prime coated. A portable spray outfit is said to be the most satisfactory method of painting for finish.

This type of construction has been developed for dwellings of two stories. While the steel roofing and siding might not be used on such a building, the framework lends itself readily to other types of fireproof covering.

Cost is reported to be comparable with that of a first-class frame building, and considerably below the range of some other fireproof types.

"Forward with Stainless" is the title of an attractive booklet, beautifully illustrated, which briefly outlines most of the various industrial uses for which rustless steels are suited. It is published by the American Stainless Steel Co., Pittsburgh.

Production of babbitt metal in November declined to 1,861,737 lb. from 2,047,100 lb. in October, according to reports received by the Bureau of the Census from 43 manufacturers.



Exterior and interior of garage built entirely of steel. The "clapboard" siding and roof consist of rolled members.

Protecting Weak Spots in Open-Hearth Furnaces

By C. W. VEACH
Bettendorf Co., Bettendorf, Iowa

EMERGENCY repairs to front walls of open-hearth furnaces may be made with a chrome ore product, mixed to a paste and preferably associated with a small amount of magnesite. How this saved a costly shutdown, and enabled a furnace to continue for another 125 heats, is here told.

HOW pleased open-hearth operators would be if they could only make the front walls of their furnaces last 300 heats. The life of nearly every other vital part of the furnace has been extended even longer than 300 heats; partly by changing the design and materials, and partly by better flame control. But the lasting quality of refractory materials in any section of a furnace is affected tremendously by intermittent cooling down and heating up again. Thus, frequent cooling down to renew the front wall shortens the life of the whole structure.

Various schemes have been tried to make front walls last longer. One not without merit is the use of a sectional door frame. The upper part of the frame projects into the wall and supports the arches, making it possible to renew the jambs without disturbing the upper part of the wall. The use of chrome brick in front walls as well as in other vital parts of open-hearth furnaces is gaining favor. Yet, with all the improvements made to date, the life of furnace jambs is far from satisfactory.

One material lends itself nicely to completing what other materials and methods have fallen short of accomplishing. This is a chrome-ore product, specially prepared for application on perpendicular surfaces under conditions of high heat.

Adding a little water to it and mixing to the proper consistency is the first step in getting ready to apply the material to the surface where wear is too rapid, or where injury has been caused accidentally—such as scraping a jamb with scrap steel projecting over the edge of a charging pan. Providing proper tools for applying the material to the perpendicular surface is a prerequisite. But training the furnace helpers in its use is of utmost importance.

When order books are full and each furnace is being pushed for every ton possible, the executive in charge of a sizable open-hearth plant has too many responsibilities to be bothered with petty details. And that any innovation requires a certain amount of detail work is obvious.

Therefore it would seem that this period of slackness might profitably be used in an effort not only to find wider use for the materials we have at our disposal, but also to instruct those under our supervision in a more intelligent way of using the materials. The savings possible and the advantages gained will surprise even the most skeptical.

How to Make Front Walls Last Longer

PROPERLY instructed furnace helpers become skillful in applying chrome ore to parts of the furnace which show undue wear, and can make repairs without losing production time. The best time to begin facing the jambs is when the wear on the lower part of the wall is sufficient to cause a noticeable overhang of the upper part.

If the wall wears evenly, clear to the skew-back, nothing is gained by daubing the lower part with chrome-ore paste. However, this is the exception and not the rule; in this case an adjustment in the direction of the flame may be found advantageous.

If the jambs show a tendency to spall early in the campaign, the first few courses of brick above the sill plate should be covered with chrome ore prepared to a paste. Precaution should be taken that the material of the bank on which the chrome ore rests is sintered properly, before attempting to apply the covering. The bank must be sufficiently heavy to afford a firm foundation for the chrome ore to rest on.

If it is required to cover only to a height of 12 or 18 in., one operation will suffice. But if it is intended to apply the covering to the top of the jambs, it is well to start with a thick coating at the bottom, and build up a little at a time. Thus, for such a covering, several days may be required if the job is done during the week; and several hours if the job is done at the week-end.

Chrome Ore Makes a Hard Clinker

A difficult part of using chrome ore to protect furnace front walls lies in applying it to a perpendicular surface. However, rightly mixed and carefully applied, the material can be built up to the bottom of the arches, affording a smooth buttress which becomes a solid clinker. The clinker burns harder and is more durable if one part screened magnesite is mixed with three parts chrome ore. But if this proportion of magnesite to chrome ore is increased, difficulty in applying the mixture on a perpendicular surface will be met.

Besides preventing wear of the portion of the wall covered with chrome ore, this covering protects the banks against scorification from silica runs from the brickwork above. The silica affects the chrome clinker very little. And the latter, because it rests on the banks, causes the silica to fall into the bath, where it is neutralized by the basic material of the slag. This preservation of the walls and the protection that chrome ore affords the furnace banks is, alone, sufficient justification for its use.

An account of the writer's reason for adopting this practice, and the saving it made in furnace maintenance expense, will be of interest to other operators. The situation was as follows:

We had a furnace that must soon be taken off because the front wall

(*Concluded on advertising page* 30)

DESIGNING

By WILLIAM SPRARAGEN
Secretary, American Bureau of Welding, New York

SUPPLEMENTING the article on welding in the pressure vessel field in THE IRON AGE of Jan. 14, the author describes safe designs for head construction, discusses the necessity for stress relief, and outlines the various approved methods of inspecting and testing the welds. He offers an interesting comparison of safe-working fiber stresses obtained by the Kinzel-Miller formula and allowed under the regulations of the American Society of Mechanical Engineers. Methods of insuring ductility in the welded joints are described.

WELDED construction has permitted the testing of vessels at hydrostatic pressure several times the working pressure. As the result, it has been possible to determine experimentally the exact behavior of vessels at high pressures.

In such a series of investigations made in the laboratories of one or two companies, zones of unexpected weakness were found in several important points, notably at the knuckles of dished heads, manhole openings and at nozzles. The stresses at the knuckle, when standard dished heads are used, are entirely out of proportion to those in the shell and are of sufficient magnitude to give considerable concern, even where the shell design is based on the factor of safety of five or more. Investigations show that the correct design for eliminating high local stresses is an ellipsoid with a ratio of two to one between the major and minor axis.

There is a considerable difference of opinion in regard to the best methods of attaching these heads to the shell. However, it is generally conceded that the double-welded butt type is the best wherever it is possible to use this type of construction, and, in fact, the Boiler Code Committee of the American Society of Mechanical Engineers makes this type mandatory for Class 1 vessels, and even for Class 2, except for thicknesses of ⅝ in. or less, in which case they may be of the single butt type. On the other hand, in Class 3 vessels both the butt and lap type are permitted.

Dished heads concave to the pres-

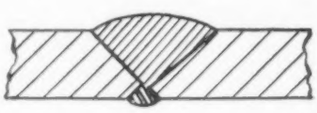


Fig. 1

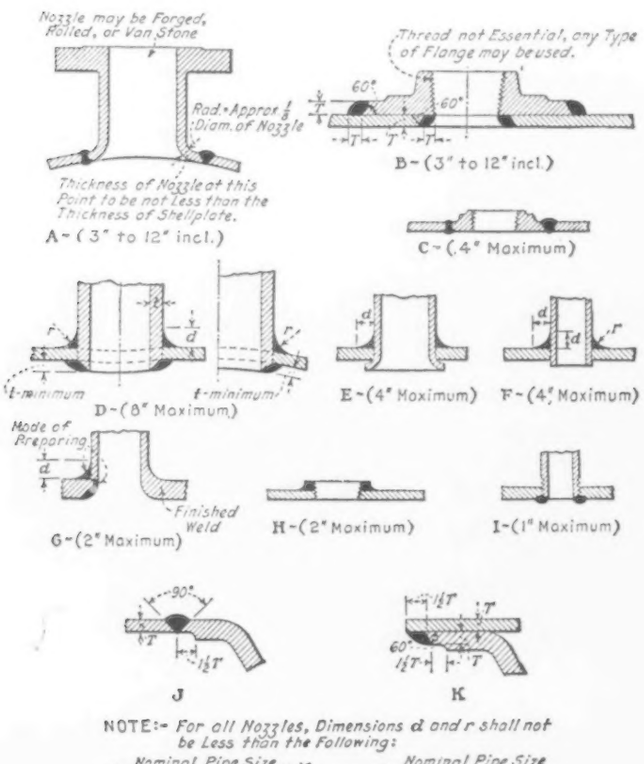

Nozzle may be Forged, Rolled, or Van Stone
Rad.=Approx. ⅛ Diam. of Nozzle
Thickness of Nozzle at this Point to be not Less than the Thickness of Shellplate.
A~(3" to 12" incl.)
Thread not Essential, any Type of Flange may be used.
60°
B~(3" to 12" incl.)
C~(4" Maximum)
t-minimum
D~(8" Maximum)
E~(4" Maximum)
F~(4" Maximum)
Mode of Preparing
Finished Weld
G~(2" Maximum)
H~(2" Maximum)
I~(1" Maximum)
90°
J
K
NOTE:- For all Nozzles, Dimensions d and r shall not be Less than the Following:
d = Nominal Pipe Size / 8 + ¼"
r = Nominal Pipe Size / 2

Fig. 2

FIG. 1.—Single V weld used with incompletely fused filler material, chipped out and filled in from opposite side of plate.

Fig. 2.—Methods of autogenously welding nozzles and heads, specified by A. S. M. E. code.

Fig. 3.—Ellipsoidal head oxy-acetylene-buttwelded to tank in approved manner. The tank is 7 ft. by 35 ft.

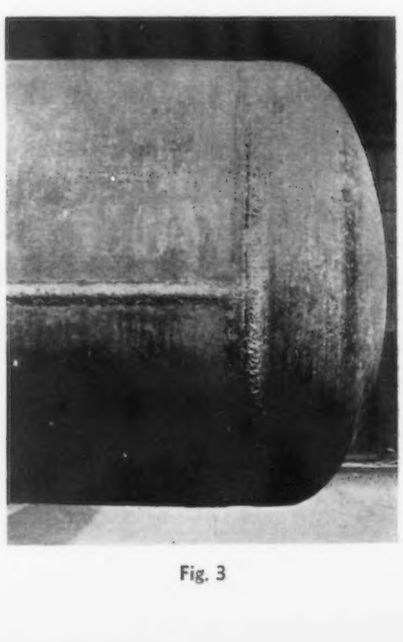


Fig. 3

AND TESTING WELDS IN HIGH-PRESSURE VESSELS

◆ ◆ ◆

sure may be also inserted in the heads under certain conditions. For vessels greater than 20 in. they must be welded inside and out. For vessels in Class 3, less than 20 in. in diameter, the heads may be welded on the outside only. The greatest objection to the usual design of welded inserted heads, concave to the pressure, is that it is not possible to prevent some bending strains on the weld because of the distortion of the head under pressure and because a perfect fit cannot be had.

For thin material, ⅜ in. or less, and for small diameter tanks about 24 in., the author believes that the series of designs which he has assembled as Fig. 6 are entirely safe, provided the dimensions and location of the welds shown in the illustrations are followed.

British Experience Differs

It is somewhat interesting to the author to note that the experience of British investigators in head design differs from that of the United States. In a paper by L. W. Schuster, appearing in the May, 1930, issue of the *Journal* of the American Welding Society, a large series of different types of head construction are considered and commented upon. While the head construction shown in Fig. 2J is conceded to have a high rating, particularly if the V joint is welded on, both inside and out, they regard it as somewhat dangerous because of bending at the end. In fact, they look more favorably upon a double fillet lap joint, with proper length of flange, as a somewhat superior type of construction.

Mr. Schuster recommends some crimping method to increase the safety of the head construction. In a series of tests made at the Bureau of Standards, crimping was not found to materially increase the safety of a vessel. On the other hand, Mr. Schuster does not look favorably upon the head construction shown in Fig. 2K. His comment is that this type of construction is subjected to an out-of-line pull, although he concedes that the primary bending action is reduced, owing to the part being circular. The author favors the head construction shown in Fig. 2J, provided it is also welded from the inside as shown in Fig. 6F, above all other types of head construction for vessels required to withstand great pressures.

The design of inwardly dished heads is a matter of importance with pressure vessels owing to the stress imposed on the weld in the event of its inverting or becoming partially inverted. It is common on a hydrostatic test to destruction for a weld of an inwardly dished head to be the first part to fail owing to the bulging. A partial reversal of the head at times may cause considerable distortion of the end of the shell. It does not necessarily follow that the head is unduly weak but merely that it is the weakest part.

In some tests which the author has seen the bulging pressure has been too low and failure would not have occurred had the head been convex. This shows that great care must be used in the design and use of the inwardly dished head. The Boiler Code Committee of the A.S.M.E. has prepared formulæ for the design and insertion of dished head construction which are given in paragraphs U-36 to U-39 and U-74 to U-76 of the

Fig. 4.—Testing by hammering oxy-acetylene welds while under 400-lb. per sq. in. hydrostatic pressure.

unfired pressure vessel code. These paragraphs also cover the matter of openings in the head.

Stress Relieving Required

There is an increasing tendency to require stress relieving for vessels made of plate 1 in. in thickness or more. The Boiler Code Committee has, in fact, required that all fusion-welded vessels coming in Class 1 shall be stress-relieved. Even in Class 2 vessels, where the ratio of diameter to the shell thickness is below a certain amount, stress relief is necessary; 1100 to 1200 deg. F. has become the accepted temperature range for stress relieving. The vessel is held at this temperature one hour per inch of thickness, and then slowly cooled.

Hydrostatic, Hammer Impact and Other Tests

The requirements for testing and inspection are rightly more rigid for the welded vessel than for corresponding riveted vessels. A hammer test is required while under pressure, after which the hydrostatic pressure is raised to two times the allowable working pressure.

There are somewhat rigid specifications in the new boiler code requirements for testing of welds, particularly for the Class 1 vessels. The test specimens are to be made up in the same way as the welding of the vessel or drum. Tension specimens with the welds machined off are required to equal the tensile strength of the plate. Tension specimens taken from the deposited metal are also required to equal at least the minimum strength of the plate to be welded with an elongation of 20 per cent. A bend test is also required with a specimen bent cold under free bending conditions. The elongation is measured across the weld on the outside fiber, and for Class 1 vessels is required to show an elongation of 30 per cent.

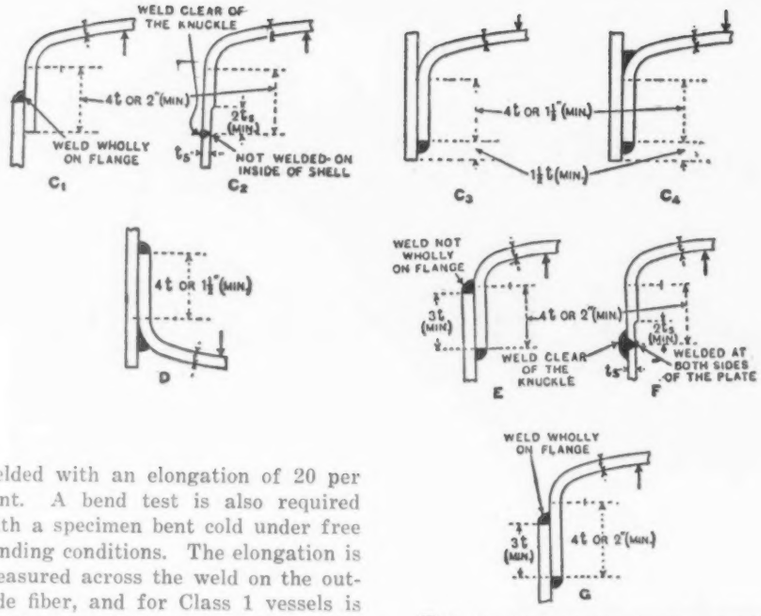


FIG. 6.—Head designs for thin material and small-diameter tubes. Preferred designs are *F* and *G*

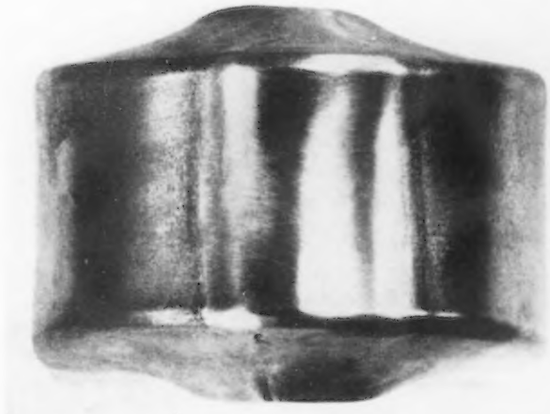
The importance of chemical analysis, particularly for porosity and nitrogen, is stressed, in that the chemical analysis is required to show not over 0.03 per cent of nitrogen as iron nitride. The minimum specific gravity is required to be 7.80.

Non-Destructive Tests

As indicated in the opening remarks, one of the important factors leading to the permission to use welding in Class 1 vessels has been the development of non-destructive tests for welds. X-ray tests are required in Class 1 vessels of the circumferential and longitudinal seams except for vessels over 2½ in. The author believes that this is a fair requirement for this class of vessels with the present state of the art. In time, welding will undoubtedly be accepted as a recognized method for the fabrication of important vessels, and these restrictions will perhaps be removed.

In Grade B welding, which is required for Class 2 vessels, the tensile strength with the weld reinforcement retained must equal that of the plate, and with the weld reinforcement ground off must equal 95 per cent of the minimum tensile strength of the plate used. In the free bend test, an

FIG. 5.—A bend test made in a welded joint in plates 2 in. thick. This welding meets the requirements of class 1 vessels.



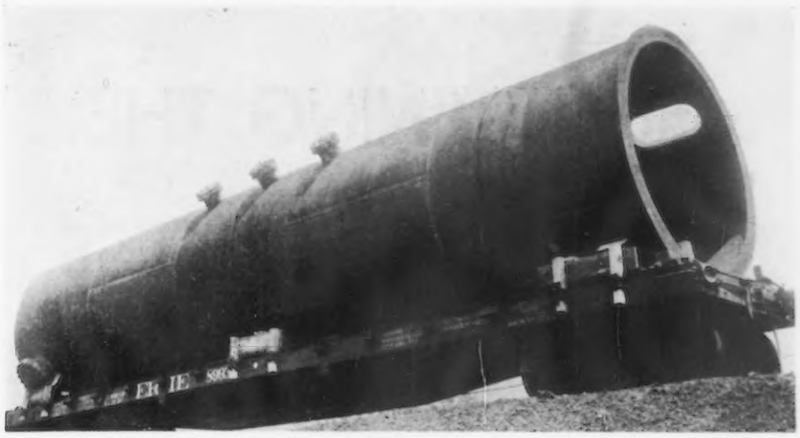


Fig. 7.—Flash tower fabricated by Petroleum Iron Works, 10 ft. in diameter by 48 ft. long. Thickness of shell is 1 in. and of head is 1⅛ in.

elongation of the outer fibers of 20 per cent is required for arc welding, and 15 per cent for oxy-acetylene welding. Although X-rays are not required for Grade B welding, an impact test is substituted primarily for the purpose of indicating the soundness of weld as evidenced by the absence of oxide or slag inclusions.

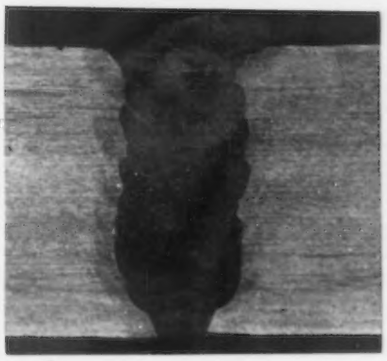
The Kinzel-Miller Formula

In Grade C welding, which is required for Class 3 vessels, the tensile strength with the weld reinforced must equal the plate, and with the reinforcement removed must equal 85 per cent of the minimum tensile strength of the plate. However, in no case is a tensile strength permitted of less than 42,000 lb. per sq. in. The minimum ductility required by the free bend test is 10 per cent.

It will be recalled that a few years ago a formula for the safe working fiber stress in the design of pressure vessels was developed by A. B. Kinzel and S. W. Miller of the Union Carbide and Carbon Research Laboratories, Long Island City, N. Y. This formula takes into account the ductility of the weld metal in such a way that the lower working fiber stress would be allowed where the weld metal has low ductility. The formula is

$$S = \frac{T}{7.15} \sqrt[3]{\frac{E}{10}}$$

in which S is the allowable working fiber stress. T equals ultimate tensile strength and E the percentage of elongation as determined by a bend test. This formula was based on a large series of tests made by the Union Carbide & Carbon Co. It was held by some to place undue emphasis on the ductility of the weld metal. The proper range of applicability of the formula has not yet been determined. From evidence submitted to the author, it is doubtful whether it would apply to vessels made of plates ¼ in. or less in thickness.



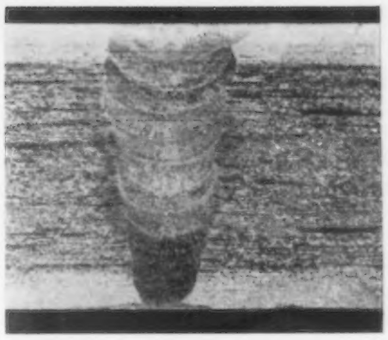


FIG. 8.—Macrographs of an arc weld made with a special flux-covered electrode and with the weld deposited in a number of layers.

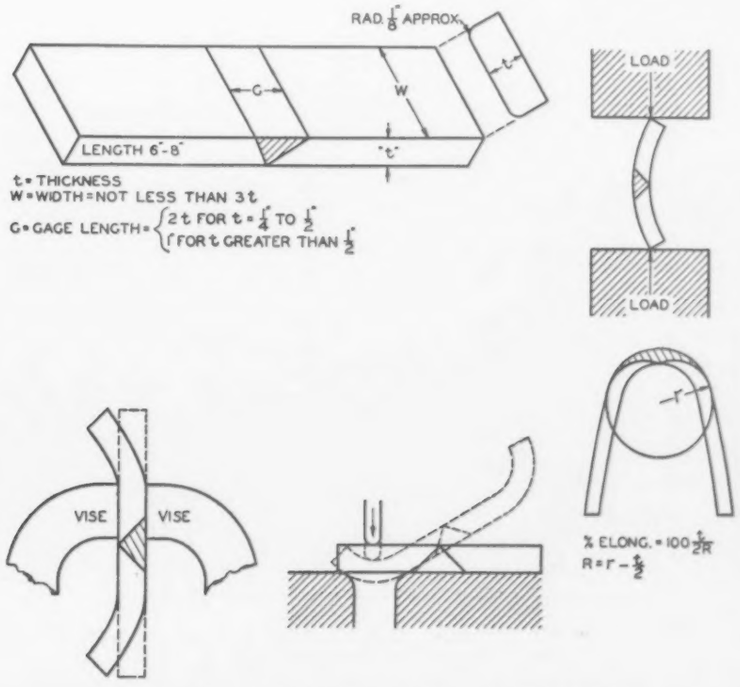


Fig. 9.—Making free bend test to determine ductility of welds.

The value of E is the percentage of elongation determined by the bend test in which there is no restraint at the bend during its making. The test piece is slightly kinked at each end somewhat outside of the weld and it is then bent endwise as a column in a testing machine, vise or press. At the first sign of cracking, the bending is stopped and the distance between the gage mark previously laid out in the weld metal is again measured, the elongation being measured the same as in the usual test piece from which is determined the percentage of elongation. The weld reinforcement should be ground off. The method of making the test is illustrated in Fig. 9.

As a matter of interest the author has checked up this formula with the new design figures and allowances provided under the latest draft of the

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SHORTENING THE NITRIDING PROCESS

By JOHN J. EGAN
Research Metallurgist,
Union Carbide & Carbon
Research Laboratories, Long Island City, N. Y.

TO reduce the time of the nitriding cycle has been the aim of metallurgists since the inception of the process some ten years ago. Two methods developed in the laboratories with which the writer is associated have already been described before this society. These consist in the use of inert materials as packing in the usual ammonia treatment, and in the use of a special molten salt bath.

In the present paper, improvements in these methods are described, as well as several other means of accomplishing this acceleration of the nitriding reaction. Although in some instances experimental work has not advanced beyond the laboratory stage, commercial possibilities are indicated. In general, the work described was carried out on two types of steel, a chromium-vanadium steel known to the trade as Nitralloy 630, and a chromium-aluminum steel known as Nitralloy 125. The analyses are given below:

	Nitralloy 630, Per Cent	Nitralloy 125, Per Cent
Carbon	0.25	0.26
Chromium	1.69	1.69
Vanadium	0.63	nil
Aluminum	nil	0.91
Molybdenum	nil	0.10

Thin Cases Hard to Evaluate

The testing of such thin cases as are here reported presents a difficult problem. Most instruments recognized at present as capable of measuring hardnesses of the order of nitrided steel are of the indenting type, the hardness number being a function of depth of penetration or some dimension of the impression produced under a given load. When working with these thin cases the penetrating medium easily breaks through, the reading thus becoming an integrated value of case and core hardness. Nevertheless, for purposes of comparison, all pieces here described were subjected to test in the Monotron and Rockwell "B," after which the case depth was measured under the microscope, using the etch developed by J. R. Vilella.

The hardness of the cases reported was found to be of the same order as that of cases obtained by the usual long-time ammonia treatment, nominally 1000 Brinell. Due to difficulties in evaluating these thin cases (a condition encountered even with the deeper ones) any more quantitative statement has been avoided. Obviously the only true test is a service test, and in order to simulate service conditions many of the specimens were subjected to wear tests in a machine (described in the paper). These showed a wear resistance equal to that of specimens nitrided by the usual methods for considerably longer periods. In most of the tests a treatment of 4 hr. was adopted as standard. Although 10 hr. are required with the usual ammonia process, all the methods here described produced appreciable cases with satisfactory hardness in 4 hr.

The Duplex Cyanide Process

In the cyanide process, as originally reported, the work was heated for a period of 2 hr. in a molten mixture of 47 per cent potassium and 53 per cent sodium cyanides. By this treatment cases of approximately 0.0005 in. depth were obtained, which, despite their thinness, possessed high surface hardness and wear resistance. The advantages of a molten bath as the nitriding medium are quite obvious. No preliminary flushing or subsequent cooling cycle is necessary, with their resulting loss of time, and the furnaces and other equipment are not tied up. On the other hand, the very thin cases obtained were a serious handicap, and considerable work has since been done in an effort so to modify the procedure as to bring about improved properties permitting wider commercial application.

Several successful commercial applications of the process have already been made, of which the hardening of engraved master rolls for cloth printing is an excellent example. Here deep nitrided cases fail completely, due to brittleness, while the thin and considerably more ductile cases such as are produced in the cyanide bath outlast the best hardened steel rolls many times.

Mixtures of Ammonia and Oxides of Nitrogen

In a search for more efficient gaseous nitriding media a study was made of those reactions or decompositions which at nitriding temperatures liberate nitrogen as one of their products. Among these the reactions between ammonia and the oxides of nitrogen seemed to hold particular promise. Mixtures of ammonia and nitric oxide when passed over heated

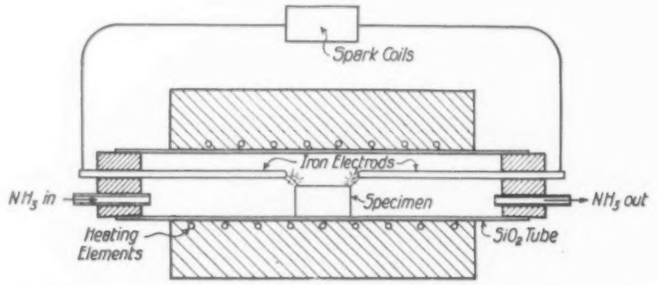


FIG. 1—Apparatus for insuring high dissociation in immediate vicinity of work (spark gap mounted within nitriding chamber).

▲ ▲ ▲

SINCE nitriding by the usual method takes 10 hr., various attempts have been made to shorten the process. In general, these quicker processes produce a thin case, for which, however, there are countless applications. Some of the newer methods, by which appreciable cases with satisfactory hardness are produced in 4-hr. cycles, are outlined in this article, abstracted from a paper presented at the National Metal Congress. Comments on the paper by two other authorities are also presented.

The process particularly recommended by the author is one in which a mixture of ammonia and nitric oxide is used. This method represents no great departure from ordinary practice and produces a case of 0.01 in.

▼ ▼ ▼

copper gauze or platinized asbestos react according to the following equation:

$$6NO + 4NH_3 = 5N_2 + 6H_2O$$

Nitrous oxide behaves similarly but with explosive violence. Tests were carried out in which a mixture of ammonia and nitric oxide was passed into the nitriding container, the nitric oxide being produced by the action of a solution of potassium nitrite on one of ferrous sulphate in sulphuric acid. After even as short a period as 2½ hr. appreciable cases were found. Further tests in which the specimens were wrapped in copper gauze resulted in deeper cases.

Later experiments seemed to indicate that, as the amount of nitric oxide increased and approached the theoretical 60 per cent called for in the reaction, case properties were improved. Nitric oxide alone had no effect. The best results are obtained in the presence of copper gauze or chips.

Ammonia Through Nitrogen-Containing Compounds

Some of the earlier investigators had reported that improvements in case properties were obtained when the ammonia was passed through benzol before entering the nitriding chamber. Considerable experimental work along this line was carried out at the author's laboratories and it was found that by the use of a nitrogen-containing compound, such as aniline, considerable improvement was effected. When the ammonia was passed through aniline heated in a water bath to 212 deg. F. cases of approximately 0.007 in. on test pieces of chromium-vanadium steel and 0.003 in. on chromium-aluminum steel were obtained in 4 hr. at 860 deg. F. A number of other compounds were tried with very satisfactory results, e. g., quinoline, pyridine, alpha-naphthylamine, phenylene-diamine, and diethylamine.

The greater efficiency of the aniline than of the other materials studied is quite evident. No very plausible explanation of the mechanism of the reaction has been advanced since no relation could be found to exist between nitriding efficiency and physical or chemical properties.

Activated Sand as Packing Material

P. G. Nutting has reported that by the treatment of sea sand with hydrofluoric acid or molten potassium hydroxide at 660 deg. F. for 1 to 2 min., followed by boiling in hydrochloric acid, washing and drying, the oil-absorbing properties of the material are greatly enhanced. In view of the successful results obtained with inert material as packing it was thought advisable to test the possibilities of this activated sand in nitriding.

Several runs were made using a vitreosil tube as the nitriding container, specimens of chromium-vanadium steel being packed in the sand and heated for 4 hr. at 860 deg. F. (460 deg. C.); excellent cases resulted. Somewhat higher surface hardness was noted in these cases over others of equal depths obtained by different methods, and it is thought that the wider surface zone is the cause of the phenomenon. This layer which probably represents the zone of highest nitrogen concentration is usually much narrower in cases produced by other means in the same period.

Dissociation measurements made during tests in which inert material was used as packing resulted in values considerably in excess of the customary 25 to 30 per cent. In spite of this, as previously reported, excellent cases were obtained, which suggested the possibility that this low dissociation was not essential to successful nitriding and various means

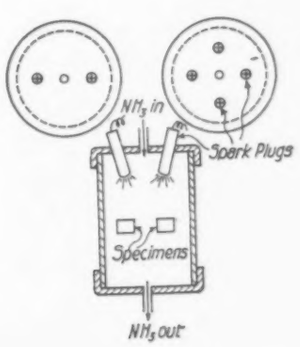


FIG. 2—Typical metal nitriding containers with spark plugs mounted within.

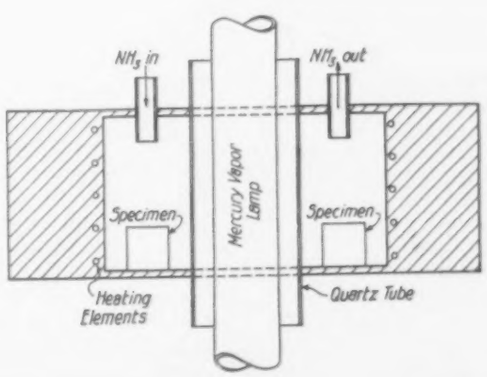


FIG. 3—Furnace for testing effects of ultra-violet light on ammonia and its possibilities in nitriding.

of increasing it were accordingly investigated. A spark gap suitably mounted within the nitriding chamber and connected to an outside power source seemed a rather simple means of insuring high dissociation in the immediate vicinity of the work, and the apparatus shown in Fig. 1 was constructed. The electrodes consisted of 1/16-in. iron wire, mounted in rubber stoppers so that the length and location of the spark with reference to the test piece could be varied.

A preliminary test was made in which a specimen of chromium-aluminum steel was heated for 4 hr. at 860 deg. F. (460 deg. C.), the spark passing directly to the piece. Subsequent examination indicated a depth of 0.006 in. Further study indicated that best results were obtained when the spark was close to or directly upon the specimen.

The next efforts were directed toward the construction of a metal container, and various forms typified by Fig. 2 were tried out. These cases in no instance equaled those made in the vitreosil tube, which may be due to the fact that only in the latter tests did the spark pass directly to the specimen.

Ultra-Violet Light Used

The effect of ultra-violet light on ammonia has been discussed by many investigators who have reported that under its influence decomposition is rapid. To study its possibilities in nitriding, the furnace shown in Fig. 3 was constructed and a series of tests made. The work is placed in the chamber about the quartz tube. Ultra-violet light, produced by a special quartz mercury-vapor lamp extending through this tube, thus irradiates the metal and gas during treatment. Dissociation under these conditions has been found to be quite high, which perhaps explains the ability to produce hard, satisfactory cases in a short time when ultra-violet light is used.

In line with the general study of the possibilities of accelerating the nitriding reaction by means of irradiation and electric fields the action of high-frequency currents was investigated. Many tests were made in which the nitriding container was heated in a high-frequency induction furnace. Remarkable improvement was effected. A specimen of chromium-vanadium steel nitrided for 4 hr. at 860 deg. F. (460 deg. C.) showed a case depth of 0.010 in. Mahoux has recently reported a much increased nitriding speed when the specimen, during nitriding, is subjected to the action of high-frequency oscillations, which substantially checks the work herein described.

Discussion of the Results

A study of the results of the tests brings out several interesting facts. Based on the efficiency of the methods, as measured by the depth of case produced in a given time, they may be broadly divided into two classes, the first group including the use of the ammonia-nitric oxide mixture, the electric spark, and the high-frequency current heating; and the second, the duplex cyanide treatment, ultra-violet light, activated sand, and nitrogen-containing compounds. Of the more efficient processes, all included in the first group, the spark and the high-frequency current require further study before they may be applied commercially. The use of the ammonia-nitric oxide mixture, on the other hand, should fit rather readily into routine nitriding since the method involves no great departure from current practice save the proper premixing of the gases and the use of the copper gauze or chips. In addition, the production of cases 0.01 in. in depth in 4 hr. should insure its ready acceptance.

Discussion by Dr. V. O. Homerberg[1]

Nitriding in a cyanide bath to procure a case depth of 0.004 to 0.005 in. in 4 hr., with a surface hardness of 1000 Monotron-Brinell, represents a very important accomplishment. There are a great many applications where this thickness of case is ample.

I have made comparisons in the depth of case between the Cr-Va and the Cr-Al-Mo steels after nitriding at 860 deg. F. Such a comparison is not a fair one because the temperature is not a proper one for the latter steel. It is true, however, that vanadium tends to increase the depth of case.

Results of nitriding in the presence of high-frequency currents are interesting, although the author has possibly misinterpreted the method used by Mahoux in accelerating the nitriding action. The author placed the nitriding container in a high-frequency induction furnace, but Mahoux's results were based on mechanical oscillations of the specimen at high frequencies.

Discussion by O. E. Harder[2]

In connection with the statement of the author where he shows the effect of copper gauze on the depth of penetration, it is of some interest to note the results which have been obtained by nitriding copper-plated specimens. According to a British patent No. 345,659, an alloy steel coated with copper or silicon, cobalt, molybdenum or so on is suggested as a means of nitriding steels which are not satisfactorily hardened by the usual process. These steels vary in carbon from 0.12 to 1.00 per cent, in chromium from 1.0 to 14 per cent, in nickel from 0.3 to 14 per cent, in tungsten 2.0 per cent, in manganese 0.4 to 13 per cent with an average of 0.20 per cent molybdenum. It would seem that copper either used as gauze surrounding the material (Egan) or as a coating favors hardening by ammonia in the usual nitriding process.

[1] Massachusetts Institute of Technology, Cambridge, Mass.

[2] Battelle Memorial Institute, Columbus, Ohio.

New Aluminum Coating Is Acid-Resistant

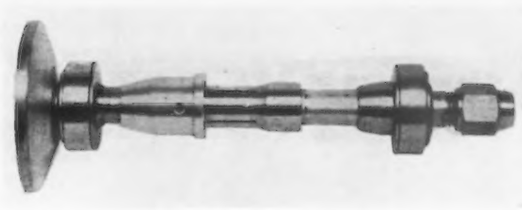
A NEW aluminum coating for metal has been developed by Aluminum Industries, Inc., Cincinnati. Known as "Permite Resalum," it has synthetic resin for a vehicle and contains no natural oils, gums, or vegetable acids. It will stand ready-mixed for as long as a year without oxidizing, it is stated.

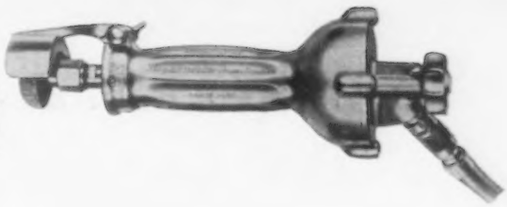
The resin content is chemically inert and tests indicate that it is unaffected by any of the common acids, such as sulphuric, nitric, hydrochloric or carbonic, or any of the common alkalis, such as sodium hydroxide or ammonia. It is highly waterproof and unaffected by ultra-violet light rays. As the coating contains no hydrocarbons, which are susceptible to chemical change, it is said to be resistant to destructive agents.

As drying depends upon evaporation of the solvents used, the drying time may be changed by varying the solvents. Drying now varies from 15 min. to 96 hr. It is suggested that since air and sunlight do not oxidize and destroy the resin, it should disintegrate very slowly and exposure tests have indicated this to be the case.

The coating is being offered in three standard grades: heat-resisting, noncorrosive and weather-resisting. The first of these grades is intended to withstand heat up to 1100 deg. F., and is fairly resistant to acids and water. The second will withstand dilute mineral acids in fumes, salt water and severe moisture, and the third, or weather-resistant type, resists heat up to 400 deg. F., and ordinary corrosive fumes and salt air.

The coating may be brushed or dipped and may be sprayed at 30 lb. pressure. When brushed or sprayed it will cover 750 to 900 sq. ft. to the gallon, depending upon the surface and method of application. It is shipped ready-mixed in standard grades and also furnished in special mixtures for specific conditions.





IN addition to automatic speed control, use of die cast magnesium alloy rotors is a feature.

Air Grinder with 1½ In. Wheels Operates at 30,000 R.P.M.

TO the line of air tools manufactured by the Madison-Kipp Corpn., Madison, Wis., has been added the Miracle Kipp air grinder, model Double D, which is designed for grinding wheels up to 1½ in. diameter and operates at 30,000 r.p.m. It is 9¾ in. long and weighs 2½ lb. Mounted grinding wheels, designated as the Double D, and available in 41 sizes and shapes and in four grades, have been developed for use with these machines.

In addition to use in making and repairing dies, tools, jigs and fixtures, this new grinder is more adaptable than the company's smaller air tools to production operations and to light snagging. It is suitable for special internal grinding, auto body work, the grinding of welded joints and for general machine and repair work.

Automatic speed control is an important feature. It is pointed out that shop air pressures vary widely (from 50 to 120 lb.) as between different plants, and vary also in the same plant at different times of the day. To meet these conditions and to eliminate "running away" when pressures are at maximum, the machine is equipped with automatic speed control that closely holds the speed of 30,000 r.p.m. at both the low and the high point of its pressure range. This control is of steel finger-tip type and is frictionless. The chrome-vanadium spring steel fingers, actuated by centrifugal force, automatically valve the exhaust air ports in such a way that the correct air flow is maintained when the grinder has reached its maximum speed.

The bodies, backplates, connectors, etc., are die castings. Use of a die cast magnesium alloy rotor is a feature, and the extreme lightness and the balance of this rotor are emphasized as providing fast pickup, eliminating vibration and reducing gyroscopic action that occurs when, under certain conditions, a mass revolves at high speed. The exhaust valve cage, a part of the speed control, is also made of magnesium alloy.

Oiling of the grinder is accomplished effectively by means of a syringe-type pressure oiler, which is inserted into the collet end of the hollow spindle from which radial holes lead to the bearings. One push of the handle oils the machine. The oil used is specially prepared for high-speed grinder lubrication.

Shaped to fit the hand, the tool is adapted for one-hand grinding with accuracy and without fatigue. The wheel guard may be removed quickly for internal grinding, and a quick-acting connector is supplied to facilitate connecting and disconnecting the grinder from the air hose.

The Kipp Double D mounted grinding wheels are available in nine shapes, 32 cylindrical sizes and in the following four grades: Kipplox B, for fast steel grinding; Kipplox H, for light steel grinding; Kippide, for cast iron and soft metals; and Kippnomet, for non-metallic materials.

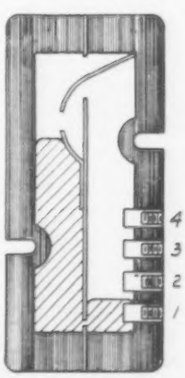
New Time Delay Switch

A TOTALLY-INCLOSED time delay switch unaffected by temperature changes, dust or other harmful atmospheric conditions has been developed by the Lincoln Electric Co., Cleveland.

Operation of the device may be likened to the well-known hour glass, since its principle is the slow movement of mercury from one chamber to another. This may be seen in the accompanying illustration, which shows the switch turned from the horizontal, or off position, to the vertical, with the mercury beginning to flow into the other cavity through a small opening. As this mercury rises it completes the circuit at the various wire connection taps. By changing one connection to the different taps, a variation in time delay is secured in each switch. By varying the size of the small opening at the bottom, the switch can be manufactured to give almost any time delay desired.

When the switch is turned off—that is, when it resumes its horizontal position—the mercury passes through a large opening into the lower chamber and the switch is ready to be used again as contact is broken immediately.

This device is mounted in connection with the contactor switch so that when this main switch goes in, the delay switch is changed immediately to a vertical position, and vice versa when the main switch is thrown off. It can be built for a time delay as accurate as 2 to 20 sec.



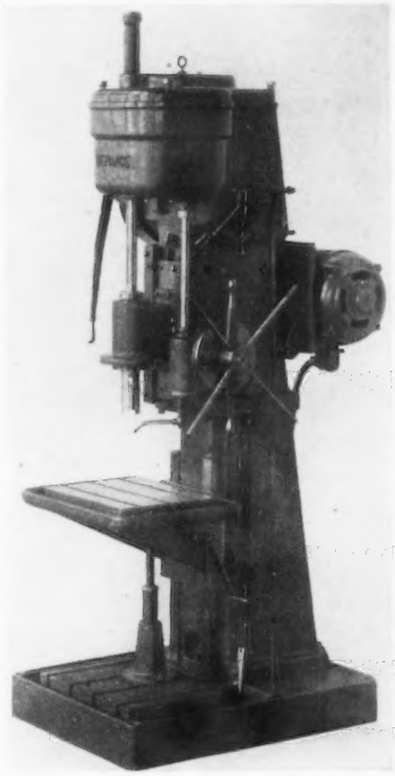
Operation of the switch may be likened to the familiar hour glass.

Electrode for Reclaiming Worn Steel Castings

FOR building up and reclaiming 11 to 14 per cent manganese steel castings by the electric arc welding process, the Stulz-Sickles Co., 134 Lafayette Street, Newark, N. J., has developed a special electrode known as the Seaco Manganal.

This electrode, it is stated, will not remove the effects of the heat-treatment through which manganese steel castings are put to assure maximum resistance to impact and abrasion. It is described as being of modified manganese steel alloyed with special minerals which have a definite relation to the carbon content in 11 to 13½ per cent manganese steel. In addition to building up worn switch points, bucket teeth and lips, crusher mantles, jaws and liners, sheaves and other 11 to 14 per cent manganese steel castings, these electrodes are suitable for laying wear-resisting manganese steel surfaces on high carbon steel or soft steel parts, such as high-carbon steel shovel teeth, etc. They are available in ⅛, 5/32, 3/16 and ¼-in. rods.

Single-Spindle Production Drill Designed for Flexibility



A SINGLE spindle 21-in. production drilling machine designed as a single-purpose continuous operation tool, but having the flexibility of a general purpose machine, has been brought out by the Defiance Machine Works, Defiance, Ohio. Designated as the No. 112 production drill, it has a capacity for drilling ⅜ to 1½-in. holes in steel.

Sixteen spindle speeds ranging from 263 to 1234 r.p.m. and 16 feeds from 0.004 to 0.025 in. are obtained by the transposition of the gears of the speed or feed train. The drive is transmitted to the spindle in a direct manner with only three gear contacts necessary at any time between the drive shaft and the spindle drive sleeve. The shafts and sleeves are mounted vertically in large ball bearings and have their upper ends multiple splined to receive the speed gear train. This train consists of four double gears multiple splined to fit interchangeably on the vertical sleeve and shafts. Gears and shafts are made of heat treated alloy steel and the gears have coarse stub teeth. A similar arrangement of four double gears with splined holes made to fit interchangeably on the upper ends of four vertical splined shafts comprise the feed train. Complicated speed and feed mechanism with sliding gears or keys is avoided. Feed rates are not affected by changing speeds.

Multiple disk driving clutches for forward and reverse when tapping are mounted on the main drive shaft; as this shaft runs at constant speed regardless of the spindle speed, the clutches always operate with a maximum pulling power. The clutch disk and driving cups are hardened steel and run in oil. The clutches are mounted between the beveled drive gears which run in large ball bearings and carry Hyatt roller bearings for mounting the drive shaft.

The spindle passes through the internally splined drive sleeve. It rotates in Timken tapered roller bearings mounted near the nose in a housing attached to a slide which carries the feed rack, this construction affording great rigidity and a means of take up and adjustment to maintain original alinement and fit. A hardened steel gib and straps serve to take up wear on the spindle slide. The slide is counterweighted and additional weight may be added to compensate for multiple-spindle heads or for self return of spindle. Feed to the spindle slide is obtained through a rack attached to the rear side and a pinion cut integral with the feed clutch shaft. This feed clutch is of the integral expanding friction type and is engaged by a short forward movement of the knock-out lever; disengagement occurs automatically at the predetermined depth of drilling. The cutting lubricant pump is driven by the main drive shaft and has a clutch for disengagement.

Either a jack screw or a set of pedestal blocks is provided for vertical adjustment of the table. The table top has standard T-slots and is surrounded with a water trough with outlet to the base. The base is planed and has T-slots for bolting large fixtures. The column is a sturdy cored casting with a large flanged top and bottom for bolting head and base. Drive may be either by belt to a single pulley, by Tex rope from motor mounted on a bracket or by silent chain.

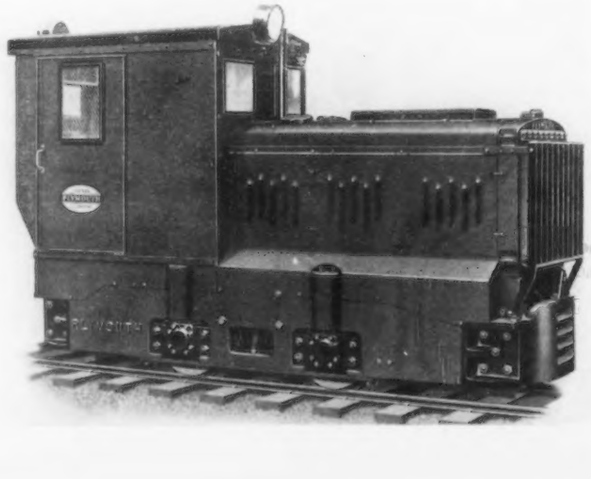
Small Diesel Driven Switching Locomotives

THREE new models of Diesel locomotives in 6, 8 and 10-ton sizes, adapted for industrial uses, have been brought out by the Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, Ohio, which now offers a range of sizes from 6 to 80 tons. The three new models have 3 cylinder, 36 hp.; 4 cylinder, 48 hp., and 6 cylinder, 72 hp., engines respectively. The engines are of the Cummins type, with 4½-in. bore and 6-in. stroke, and are equipped with electric starter.

A massive four-piece cast-iron frame is used on the smallest locomotive; the larger models have frames of fabricated steel slabs. Heavy duty roller bearings are used for the axles on all models. The transmission is of the sliding gear type, providing four speeds, both forward and reverse. All gears and shafting are inclosed in one housing.

Rolled steel wheels, 18 in. in diameter, are used on the two smaller sizes and 24 in. diameter on the largest. The wheel bases are 37½, 45 3/16 and 56 in. respectively. The smallest model has a speed up to 12 miles per hr. at an engine speed of 1125 r.p.m. and the two larger sizes a speed of 16 miles per hr. at an engine speed of 1200 r.p.m.

The small size has two coiled springs over each axle housing; the larger sizes have semi-elliptic, side and cross-equalized, spring suspension, a special feature being the self-alining side equalizer which is of advantage in passing over very rough track.



THESE Diesel-powered industrial locomotives are built in 6, 8 and 10-ton sizes.

Heavy-Duty Hydraulic Vertical Surface Grinder

A 26-IN. heavy-duty vertical surface grinder with hydraulic table drive is being announced by Pratt & Whitney Co., Hartford, Conn. This new grinder weighs 18 tons, without motors, and is of rugged construction throughout; in general design it follows the company's 22-in. machine, which it replaces. Addition of the hydraulic features and several other refinements in design have greatly increased the speed and efficiency.

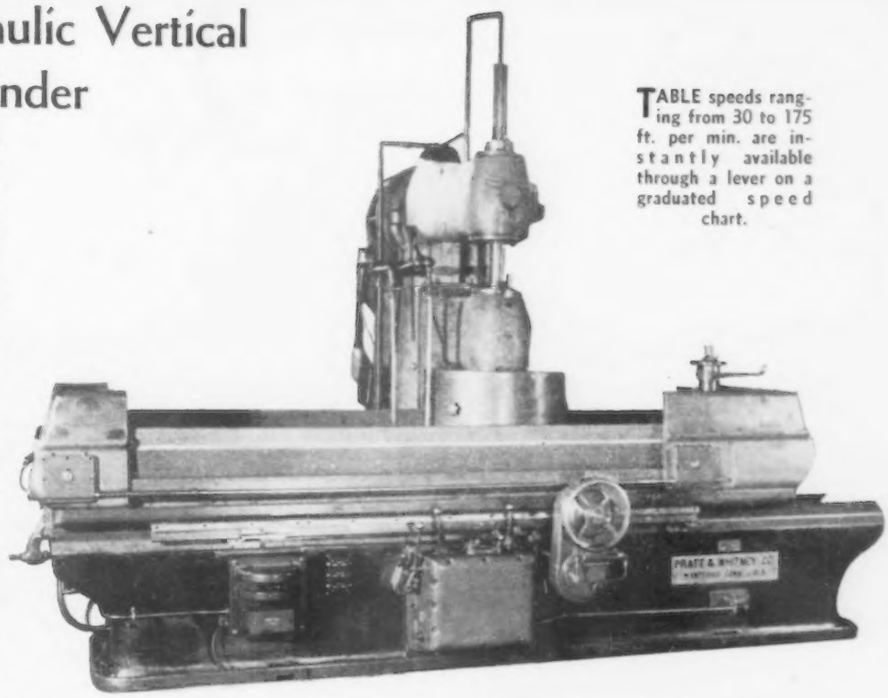


TABLE speeds ranging from 30 to 175 ft. per min. are instantly available through a lever on a graduated speed chart.

As shown in the illustration, the bed carries the reciprocating table, at the rear of which is a column carrying the wheel-head and spindle-driving motor. Table working surface is 18 x 88 in., with maximum travel of 104 in. The distance from the table top to a new wheel is 16 in., giving ample capacity for large work. The hydraulic table drive mechanism with its 10-hp. motor is back of the bed, out of the way, but all controls are in front. Table speeds range from 30 to 175 ft. per min., and, through the hydraulic drive, any table speed within this range is available instantly by moving a lever on a graduated speed chart. This permits the speed of the table to be changed to conform more closely with the wheel being used.

Length of stroke is set by means of table dogs of the rack and pawl type. The table can be reversed by hand at any time within the limit of the table dogs. By tripping a latch the table is brought to loading position and stopped automatically. A safety dog is provided at each end of the table. The front table water guard is operated by a lever, and can be raised or lowered quickly. A graduated wheel dresser is mounted on the end table guard, and is swung out of the way when not in use.

The spindle is of rugged design and is driven at 750 r.p.m. through spiral bevel gears by a 75-hp. 1150-r.p.m. constant-speed motor. It has a large flange forged on its lower end, giving maximum rigidity; the wheel chuck is attached directly to this flange. The spindle is mounted in anti-friction bearings and is lubricated from a reservoir at the top. A convenient hand brake permits quick stopping of the spindle.

Down-feed of the wheel head occurs at each end of each table stroke. The amount of feed per stroke is regulated by a graduated shield over the wheel-feed ratchet, the total amount of feed being set by a graduated dial on the wheel-feed handwheel. Hydraulic feeds range from 0.00025 to 0.005 in.; the wheel feed can also be operated by means of a handwheel if desired.

The segmental type wheel is used, which together with the higher wheel and table speeds, is said to permit use of harder segments and reduce wheel cost. Having separate motors for wheel drive, coolant pump and hydraulic pump, is said to provide ample power, so that the wheel does not slow down and impair the finish during a heavy cut. All three motors are controlled from a push button station at the front of the machine.

Coolant is supplied from a 350-gal. tank. A pump driven by a separate 2-hp. motor forces the coolant through the wheel spindle and also through a pipe line to the outside of the wheel. An additional line supplies water for washing off the chuck.

¼ In. Holes Tapped at 3000 R. P. M.

A NEW ¼-in. capacity super-sensitive high-speed tapping attachment, capable of tapping holes at 3000 r.p.m., has recently been developed by the Procunier Safety Chuck Co., 18 South Clinton Street, Chicago, Ill.

A double-cone cork friction clutch drives the tap in and backs it out. This clutch plays between two driving shells, rotating in opposite directions, and engages smoothly at high speeds, by raising or lowering the drill press lever. The tool reverses at 2 to 1. All jar and clatter are eliminated by the action of the cork clutch, and the tap instantly slips if the tap strikes bottom or sticks. This tapper is equipped with ball bearings and is effective on delicate tapping up to 3/16 in. in steel and ¼ in. in brass or similar materials.

Small General Utility Lathe

FOR general-utility use in the small shop and laboratory, the South Bend Lathe Works, South Bend, Ind., is placing on the market the 8-in. Junior back-geared screw cutting lathe illustrated. The lathe is designed for accurate work. Available in countershaft and individual motor drive, the lathe is built with a back-geared headstock with three-step cone providing six speed changes.

Mechanical features include hollow spindle of alloy steel; ¾-in. precision leadscrew; automatic longitudinal feed to carriage; tailstock set-over for taper turning; screw thread chart by which threads may be cut from 4 to 40 per in., including 11½ pipe thread. Bed lengths supplied are 24, 30, 36 and 42 in. Attachments are available for special work.

Grinder for Production and Toolroom Work

FLEXIBILITY is a major feature of the 10 x 24-in. hydraulic grinder developed by the Landis Tool Co., Waynesboro, Pa., for a wide variety of production jobs and for toolroom work. Hydraulic table traverse is at speeds ranging from 6 to 144 in. per min., and the table action is smooth and easily controlled. All mechanisms are accessible for inspection and repair.

The box-type bed of the machine contains an integral water reservoir; the base in front forms an oil reservoir for the hydraulic system. The work carriage traverses on a flat and a V-guide with one vertical side, and guideways are flood lubricated by filtered oil. The grinding wheel-head slide has a V and a flat guide with chilled surfaces. The wheel-spindle, mounted in steel-back babbitt bearings, is driven at the right-hand end through a flat belt from a balanced 1½-hp. motor located on top of the wheel base casting. Control of the motor is by push button. The wheel-head may be swiveled on its slide, permitting the wheel to be set at various angles without influencing the direction of the feeding movement. These units are also mounted on a lower swivel which can be turned so as to feed the wheel in different directions. Equipment includes both a 10 and a 12-in. diameter wheel.

The hydraulic system consists of a twin-cylinder type table traversing mechanism and a Tuthill internal geared pump. A control valve at the front of the machine governs the flow of oil from the end of one cylinder into the corresponding end of the other. Reversal takes place through the medium of a piston-type valve.

Plain wheel feed is standard. Final movement is transmitted through a pinion and rack with the company's worm and worm gear arrangement at the rear of the feed-up arm. Backlash is taken up by a long compression spring. A hydraulic automatic wheel feed mechanism can be supplied; it is operated by a small piston at the rear of the automatic feed-up handwheel and functions at each reversal of the table. It may be made to operate either at one end or the other, or at both ends. A simple adjustment allows the feeding movement to take place either just before or during reversal.

The headstock is driven by a separate motor that is controlled through a limit switch by the start-and-stop lever. Six work speeds are obtainable by changing pulleys and belts at the left-hand end of the head. The ball-bearing internal fixture regularly supplied is mounted on the front of the wheel-head and is driven by canvas belt from a pulley on the wheel motor. A hand reversing switch reverses the direction of motor rotation for internal grinding. Without motors, but with standard equipment, the machine weighs 3890 lb.; it occupies floor space of 5 ft. 4 in. by 8 ft.

Cut-Off Machine Operates at 16,000 Ft. a Minute

EXCEPTIONALLY fast cutting speed on all types of work within its range is claimed for the No. 48 "Abrasaw" cutting-off machine, a new product of the Bridgeport Safety Emery Wheel Co., Bridgeport, Conn. Equipped with a 7½-hp. 3600-r.p.m. motor, the wheel spindle runs at 5200 r.p.m., producing a wheel speed of 16,000 ft. per min. The machine is suitable for rapid and cool cutting of hard or tough metals or alloys, as well as non-ferrous metals and light sections of all kinds of material.

The driving motor balances the disk head on a rocker shaft mounted on Timken bearings, sealed against grit, and drives the wheel spindle through six V-belts. To take up slack in the belts, the motor can be rocked independently of the wheel spindle on the rocker shaft.

Work sections up to 2½ in. can be held in the standard vise for either straight cuts or angle cuts up to 45 deg. The vise swivels for angle cuts and can be quickly removed for substituting other holding devices. It is operated by a draw rod and foot treadle, thus freeing the operator's hands for placing the work and operating the cutting head. The vise grips the work at both sides of the cut and is adjusted for various sections by means of a swinging crank. The table is removable, being bolted to the frame.

As regularly equipped, the machine is furnished with 12 3/32 x 1-in. hole abrasive disks; 14 or 16-in. disks can be used with special wheel guards and driving sheaves. Ample protection is afforded by the wheel guard which is designed to withstand the impact of a bursting wheel. Sparks and chips are caught in a refuse box in the base which is easily taken out for cleaning.

National and Local Relief Plans Outlined Before Taylor Society

Reconstruction Finance Corporation, Industrial Subsidies and Local Stimulation of Consumption Discussed

"AMERICA has never laid down before an advancing enemy; we don't like to admit that any problem is insoluble." This statement by Otto T. Mallery, economist, Philadelphia, epitomized the attitude of speakers before the Taylor Society at the Hotel Shelton, New York, Jan. 27. Mr. Mallery and Edward Warner, editor, *Aviation*, New York, discussed methods of combating the depression on a national scale, while S. Parker Harman, executive secretary, Civic Unemployment Committee, Rochester, treated the subject from a local angle.

Recommends Methods Used in Liberty Loan Drives

"The most useful thing the Goverment can do," declared Mr. Mallery, "is to assist in stopping the perpendicular fall in the price level of commodities. The principal way to stop the fall of prices is to stop the contraction of bank credit. The Government is embarking on a plan to use its excellent credit to take the place of that which has vanished. The new Government credit will be used by the Reconstruction Finance Corporation and seven other similar proposed agencies. To secure the necessary funds will require the sale of Government bonds on a large scale."

Mr. Mallery recommended that drives, similar to those used to sell Liberty Bonds, be employed to float these bonds. Only in this way, he contended, can hoarded currency be drawn out of hiding. It is essential, he feels, that the bonds find their way into the hands of investors rather than into the hands of bankers.

Anti-Depression Measures That Have Failed

Mr. Warner discussed the various anti-depression measures that have been taken and found them all lacking, even casting doubt upon the effectiveness of the Reconstruction Finance Corporation.

Public unemployment insurance, he stated, leads only to new low levels of business, to a steadily increasing burden of taxation after the first year or two of dole-paying policy, and to a steady reduction of the average standard of living.

Direct local relief is also falling down, because in many instances municipal resources have already been depleted and even municipal borrowing power has been exhausted and debt limits attained. Local relief also causes the migration of the unemployed, putting an intolerable burden on cities that take their responsibilities most seriously.

In connection with public works Mr. Warner pointed out that counties and municipalities suffering from weakened credit or affected by the collapse of local banks have been forced to reduce their activities. And, despite an increase in Federal work, total expenditures on all public works are now actually lower than before the depression.

Public works, in his opinion, also have the defect of being specialized in their nature. They provide an outlet for the talents of bricklayers, carpenters and general laborers, but offer little solace to tool makers or screw machine operators.

There Must Be the Will to Borrow

Referring to the Government's latest effort to thaw frozen credit, he asserted that the present difficulty is not so much in borrowing new money as in persuading industry that its expenditures are justifiable. Something more than a mere extension of credit is needed, in his opinion, to induce business men to undertake modernization and improvement of plant.

He therefore advocated direct subsidization of production. These direct payments to industry would be limited to replacement of machinery and modernization of plant to the exclusion of expansion of capacity. The subsidies would later be recaptured, according to his plan through excess profits taxes.

Advantages of Industrial Subsidies Over Public Works

To illustrate the superiority of the industrial subsidy to public work, he cited the example of a Mid-Western town of 1200 people. This community has one important industry, upon which 80 per cent of its people depend. It also has a postoffice that cost $10,000, which is to be shortly replaced by a new building to cost ten times as much. It is obvious, in his opinion, that the people of the town would benefit far more if this expenditure were used for subsidization of employment and improvement of equipment in the plant.

Government expenditures on industrial subsidies, he stated, would supply a device for spending and saving at the same time. Essentially it would permit the embalming of present individual savings in Government bonds while spending the tax collections of a more or less remote future period of prosperity.

How organized community effort has stimulated local consumption and employment in Rochester, N. Y., was outlined by Mr. Harman. On Dec. 4, 1931, the Civic Committee on Unemployment, of which he is executive secretary, started a campaign to induce those in the community who are able to spend to spend normally. The county was canvassed by 1400 workers and 11,000 people signed pledges to make purchases totaling more than $6,000,000. A careful check by the organization indicates that expenditures are now running 14 per cent ahead of the amount pledged. The money is to be spent in the next three months, with the possibility that some purchases will extend well into the spring.

This is the latest successful undertaking of the committee, which was formed in March, 1930. The organization has an executive committee of 12 and eight sub-committees with a varied number of members depending upon their functions, and besides has a full-time secretary and permanent staff. Those devoting their time to this work now include 140 men and women drawn from walks of life which give them a first-hand knowledge of the problems of industry and distribution. One of the first efforts of the organization was to keep consumption as normal as possible. Early in 1930 it was reported that 50,000 to 60,000 people were out of employment in the community and fear stifled consumption. A careful estimate by the committee indicated that only 13,000 were out of work and this figure was later substantiated by the Census statistics which were published in June. This was a case where disclosure of the facts helped to allay fear.

Stabilizing Employment

Stabilization of employment and an encouragement of construction work were also early objectives of the committee. Efforts of Rochester companies to stabilize production and employment may be summarized as follows:

- Sales forecasts
- Production scheduling
- Manufacturing for stock
- Standardization of products
- Diversification of products
- More intensive sales efforts with more frequent contacts with buyers
- Education of public against seasonal buying
- Diversified training of the workers
- Overtime work for temporary increase in volume
- Shortening of hours for temporary below normal volume
- In some cases, concessions in price for off-season orders

Providing Work Instead of Direct Relief

Many jobs were created and industries generally provided part-time employment instead of laying off people entirely. Some companies with ample resources had programs which had been postponed and these were again set in motion. It was the consensus of opinion that work should be provided in lieu of home relief. In line

with this thought the City Council appropriated $250,000 for public works and this sum was later swelled to $800,000. Of this sum $90,000 was spent in 1930 and the remainder in 1931. An average of 5600 people were given work for two days a week for a term of three months. This year there is a similar program and 2000 people have been given employment.

One outcome of the committee's efforts to solve the unemployment problem was the adoption by Rochester employers of an unemployment benefit plan. In February, 1931, 14 companies had adopted this program and this number has now been swelled to 19, employing a total of 28,000 people. Under this plan, each plant sets aside each year 2 per cent of its payroll until the fund reaches a maximum equal to five annual appropriations.

The unemployment benefit scheme ties in with a central employment bureau, which had fortunately been organized under both State and private auspices. The bureau had been created for demonstration purposes, legislation having been passed permitting the State Department of Labor to accept money from private sources to finance the undertaking. Two or three of the foundations in New York City, working through the Industrial Relations Counselors, Inc., provided a fund supplemented by a subscription among the larger companies in Rochester, bringing the total up to $75,000 a year.

Under the improved technique of this new bureau workers and employers are speedily brought together. Workers who are laid off are sent to the employment bureau and, if they refuse to accept available jobs, their unemployment benefits cease.

Revision of Extras on Stainless Steels

Revised extras on corrosion resisting sheet steel manufactured under the patents of the American Stainless Steel Co., Pittsburgh, have been issued, effective as of Feb. 1. In the sheet classification the No. 2 finish, being the hot-rolled annealed, pickled and cold-rolled product, is now the base finish, whereas in the past the No. 0 finish, or ordinary hot-rolled annealed stock, was the base, with an extra of 3c. a lb. for cold-rolling full finishing.

This change in base has made it necessary to raise the base prices of sheets, types C1, C2, C3 and C4, 3c. a lb. in order not to disturb the existing net prices. It is emphasized that the change is in no sense an advance in price, but merely a readjustment of former schedules.

Bas prices on these sheets, effective Feb. 1, are now as follows:

Type C1—26c. a lb., base Pittsburgh.
Type C2—27½c. a lb.
Type C3—30c. a lb.
Type C4—35c. a lb.

Bethlehem Common Dividend Passed; Has Had No Business Increase

IN announcing the action of the board of directors of the Bethlehem Steel Corpn. in placing the common stock on a non-dividend paying basis, President E. G. Grace stated that the Bethlehem company experienced no increase in business during January. Bethlehem's shipments last month, in fact, were smaller than those of December. Its average operating rate a week ago was 21 per cent of capacity.

Fourth Quarter Earnings

The financial report for the fourth quarter showed that only 12c. per share was earned during the entire year on preferred stock, compared with complete coverage of preferred dividends and $5.26 per share of common in 1930. The total income for 1931 was $21,386,694, against $45,233,664 in 1930. Provision for depletion and depreciation for the year was $13,844,910, against $14,217,741 in the preceding year. The deficit for the year was $6,779,255. Cash and liquid securities as of Dec. 31 amounted to $50,278,721. Cash expenditures during the past year for additions and improvements were $12,699,897.

The average operating rate for the fourth quarter was 30 per cent, compared with 32 per cent for the third quarter and 38.6 per cent for the entire year. New business booked last year amounted to $150,077,099, compared with $239,934,505 in 1930.

Outlook Is Uncertain

Following the directors' meeting, Mr. Grace frankly discussed the business situation and outlook. As for the present, he had nothing encouraging to report. His company has had neither increase in orders nor in operations, and prospective business is still very uncertain. Mr. Grace repeated a remark he made some months ago that he would rather "pray than prophesy." He did say that he hoped for moderate improvement, but he thought that purchases by most of the important steel-consuming channels would be considerably below normal for some time. He thought the railroads would buy merely for necessary repairs and replenishments and that the outlook for structural steel was never quite so uncertain. Most of the current work, he said, involves public expenditures.

On the subject of prices for steel and all other basic commodities, Mr. Grace was voluble. He declared that steel companies and other manufacturers could not hope to make profits until they ceased selling their products at less than costs of production. When asked where the blame lay for demoralized price conditions in the steel industry, he replied that everybody was somewhat to blame. He said the only remedy was to stop selling except against cost sheets.

He was asked whether a further wage reduction was in prospect in the steel industry, and he replied that he had heard some talk along that line, but nothing had been decided by any company, so far as he knew.

Organization of the Reconstruction Finance Corpn. will, Mr. Grace believes, exert a considerable influence in stabilizing the financial structure and will help business.

Japanese to Establish Nickel Information Bureau

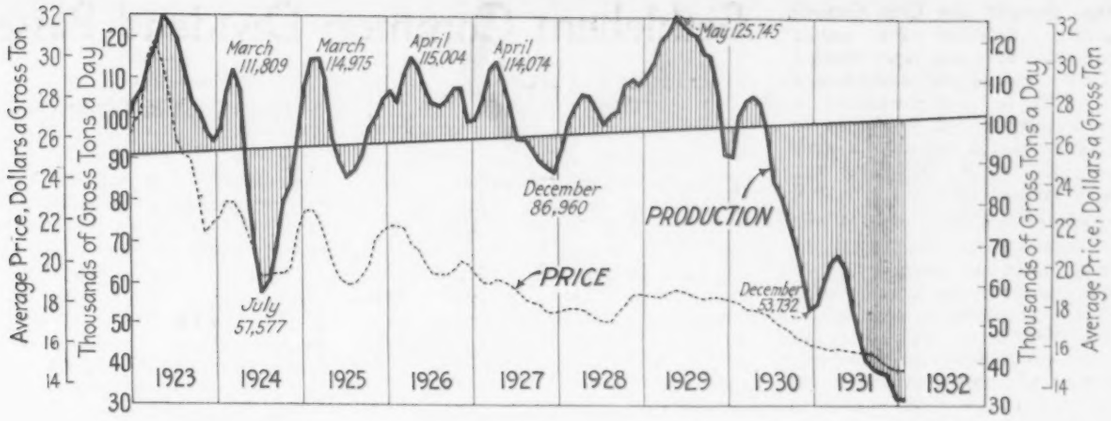
The executive committee of the Japan Society was host at a luncheon at India House, New York, on Wednesday, Jan. 27, in honor of James A. Rabbitt, formerly commercial attaché at the United States Embassy in Japan, who will leave soon to take charge of the Japanese Nickel Information Bureau. This bureau will work with the steel and other industries in Japan in the development of alloy products containing nickel. Similar bureaus are in operation in London, Paris, Frankfort, Brussels and Milan. The Japanese bureau will collect and disseminate data relating to nickel, its products and their application to industry.

Among those who attended the luncheon were the following executives of the International Nickel Co.: Robert C. Stanley, president, James L. Ashley, John F. Thompson and Paul D. Merica, vice-presidents, and A. J. Wadhams, manager of the company's development and research department; also George K. Leet, United States Steel Corpn.; Calvin W. Rice, secretary, American Society of Mechanical Engineers; R. Ishida, Mitsui & Co., and T. Kazama, Mitsubishi & Co.

Friendly Trade Relations Cited

Kensuke Horinouchi, consul general of Japan in New York, who was one of the speakers, took the occasion to comment upon the friendly cooperation from their suppliers abroad in the development of Japanese trade and industry. In all their enterprises, he stated, the Japanese people have always enjoyed a large degree of confidence in their American associates.

Other speakers were Alexander Tison, former president of the Japan Society; Dr. J. A. L. Waddell, consulting engineer, who was once a professor at the University of Tokio, and Mr. Rabbitt.



Pig Iron Output Fails to Gain in January

PRODUCTION of coke pig iron in January totaled 972,784 gross tons, an average of 31,380 tons daily. This compares with a total of 980,376 tons and a daily average of 31,625 tons in December. The January output was 0.8 per cent below that of December. The January figure is the lowest for that month since 1904. The most recent lower total for any month was 954,193 tons in August, 1921.

There were 61 furnaces in operation on Feb. 1, against 56 on Jan. 1. They were making iron at the rate of 30,630 tons daily against 29,365 tons on Jan. 1. The number of active stacks is still lower than the number in blast at the bottom of the 1921 depression, that having been 69 on Aug. 1.

Eight furnaces were blown in during January and three were blown out, a net gain of five. The Steel Corporation blew in one Mingo stack and No. 2 in the Ohio group, taking off No. 4 and Carrie No. 7. Among the independents, Republic blew in No. 3 stack in the Haselton group and the Trumbull-Cliffs furnace; the Colorado Fuel & Iron Co. blew in one furnace, as did the Jackson Iron & Steel Co., the Chateaugay Ore & Iron Co. and the Davison Coke & Iron Co. The Port Henry furnace of Witherbee, Sherman & Co. was blown out.

Of the eight furnaces blown in, two are credited to the Steel Corporation, two to independent companies and three to merchant producers.

Production of Coke Pig Iron and of Ferromanganese

	Gross Tons Pig Iron*		Ferromanganese†	
	1931	1932	1931	1932
January	1,714,266	972,784	14,251	11,250
February	1,706,621	.....	19,480	.....
March	2,032,248	.....	27,899	.....
April	2,019,529	.....	25,456	.....
May	1,994,082	.....	23,959	.....
June	1,638,627	.....	11,243	.....
½ year	11,105,373	.....	122,288	.....
July	1,463,220	.....	17,776	.....
August	1,280,526	.....	12,482	.....
September	1,168,915	.....	14,393	.....
October	1,173,283	.....	14,739	.....
November	1,103,472	.....	14,705	.....
December	980,376	.....	15,732	.....
Year	18,275,165	.....	212,115	.....

*These totals do not include charcoal pig iron. The 1930 production of this iron was 96,580 gross tons.
†Included in pig iron figures.

Merchant Iron Made, Daily Rate

1931	*Tons*	1931	*Tons*
Jan.	9,416	Sept.	8,985
Feb.	11,332	Oct.	7,051
March	11,481	Nov.	5,758
April	13,439	Dec.	6,778
May	13,212		
June	11,209		
July	12,012	1932	
Aug.	9,569	Jan.	6,256

Daily Average Production of Coke Pig Iron

	Gross Tons 1930	1931	1932
January	91,209	55,299	31,380
February	101,390	60,950	....
March	104,715	65,556	....
April	106,062	67,317	....
May	104,283	64,325	....
June	97,804	54,621	....
½ year	100,891	61,356	....
July	85,146	47,201	....
August	81,417	41,308	....
September	75,890	38,964	....
October	69,831	37,848	....
November	62,237	36,782	....
December	53,732	31,625	....
Year	86,025	50,069	....

Production by Districts and Coke Furnaces in Blast

Furnace	Production (Gross Tons) January (31 Days)	Production (Gross Tons) December (31 Days)	February 1 Number in Blast	February 1 Operating Rate, Tons a Day	January 1 Number in Blast	January 1 Operating Rate, Tons a Day
Buffalo	74,764	77,629	5	2,410	5	2,505
Other New York and Mass.	4,233	6,965	1	200	1	225
New Jersey	....	....	0	....	0	....
Pennsylvania:						
Lehigh Valley*	31,211	34,358	3	1,010	3	1,110
Schuylkill Valley	....	....	0	....	0	....
Susquehanna and Lebanon Valleys	15,380	15,415	1	495	1	500
Ferromanganese	....	....	0	....	0	....
Pittsburgh District	168,441	176,002	9	5,175	9	5,670
Ferro. and Spiegel.	4,478	4,356	1	145	1	145
Shenango Valley	....	13,339	0	....	0	....
Western Pennsylvania	18,122	15,938	1	585	1	515
Ferro. and Spiegel.	6,772	6,624	1	220	1	215
Maryland	43,366	39,455	2	1,400	2	1,275
Wheeling District	79,865	98,668	4	2,650	3	2,095
Ohio:						
Mahoning Valley	87,122	63,259	5	2,285	3	1,510
Central and Northern	71,484	80,381	5	2,305	5	2,595
Southern	14,533	11,489	2	470	1	325
Illinois and Indiana	220,556	221,981	11	6,865	11	6,785
Mich., Wis. and Minn.	22,966	20,033	2	740	2	645
Colo., Mo. and Utah	19,570	9,840	2	775	1	320
Virginia	....	....	0	....	0	....
Kentucky	....	3,529	0	....	0	....
Alabama	89,981	81,115	6	2,900	6	2,930
Ferromanganese	....	....	0	....	0	....
Tennessee	....	....	0	....	0	....
Total	972,784	980,376	61	30,630	56	29,365

*Includes spiegeleisen.

Lake Superior Ore Shipments 23,496,228 Tons in 1931

SHIPMENTS of iron ore from the mines of Lake Superior district in 1931 were 23,496,228 tons, compared with 47,187,661 tons in 1930, according to the annual report of the Lake Superior Iron Ore Association. Water shipments were 23,446,022 tons and all-rail shipments were 50,206 tons. The water movement in 1930 was 46,585,196 tons and all-rail shipments were 602,465 tons. Shipments by ranges are shown in the accompanying table.

A new method of beneficiating ore was added during the year. Ore beneficiated by the new process is designated as sinter-dried ore, which is produced by screening out the fine ore, sintering it and recombining the hot sinter with some of the coarse ore, thus partially drying out the moisture in the coarse ore. The usual ratio in employing this process is to use about 40 per cent of sinter and 60 per cent of crude ore.

A portion of the ore from three adjoining mines in the Cuyuna Range is being beneficiated by this process by the Evergreen Mines Co., Ironton, Minn., which concentrated nearly 100,000 tons in this way last year. Ore beneficiated by various processess in 1931 including crushing and screening amounted to 8,066,752 tons. Figures showing ore beneficiated by the various methods appear in the table.

BENEFICIATED IRON ORE, 1931

(*Gross Tons*)

Method	Minnesota	Michigan and Wisconsin	Total
Washed	3,172,648	.....	3,172,648
Jigged	267,787	.....	267,787
Dried	67,084	.....	67,084
Sintered	98,982	.....	98,982
Sinter-dried	91,301	.....	91,301
Total concentrated	3,697,802	.....	3,697,802
(a) Crushing and screening	2,483,806	1,885,144	4,368,950
Total beneficiated	6,181,608	1,885,144	8,066,752

(a) Improves physical structure only.

Mesabi District Shipped 65 Per Cent

The Mesabi district shipped 65 per cent of the ore last year, or the same proportion of the total as during the previous year. The Gogebic district retained second place in shipments. The Marquette Range advanced to third place, which it lost to the Menominee Range in 1930. The Vermilion district took fifth place in amount of shipments, pushing the Cuyuna Range down to sixth place.

With many properties shut down last year, ore was shipped from 136 mines, compared with 160 during the previous year and with 171 in 1929. Shipments were made from 54 Mesabi district mines, compared with 72 the year before. The Menominee district shipped from 24 mines, a loss of 5. There were shipments from 17 mines in the Gogebic Range, 18 in the Marquette and 4 in the Vermilion district, a loss in each case of one. The Cuyuna Range made a gain of 2, shipping from 19 mines last year.

The Sellers mine led in shipments during the year with 1,489,795 tons. In the previous year this mine occupied third position. The Hartley Burt mine came second, with shipments of 1,312,914 tons, and the Hull Rust mine was third, with shipments amounting to 1,144,430 tons. The Missabe Mountain mine, which in the previous two years had occupied first position, dropped down to 555,944 tons. These four mines are in the Mesabi district and are operated by the Oliver Ore Mining Co., a subsidiary of the United States Steel Corporation.

SHIPMENTS OF LAKE SUPERIOR IRON ORE BY RANGES

(*Gross Tons*)

Range	To Upper Lake Ports, 1931	All-Rail, 1931	Total, 1931	Total, 1930
Mesabi	15,269,453	958	15,270,411	31,067,292
Gogebic	2,908,160	122	2,908,282	5,063,631
Marquette	1,760,663	48,782	1,809,445	3,633,968
Menominee	1,469,060	230	1,469,290	3,609,052
Vermilion	1,140,596	114	1,140,710	1,884,529
Cuyuna	898,090	none	898,090	1,929,189
Mayville	none	none	none	none
Total United States Mines	*23,446,022	**50,206	23,496,228	***47,187,661

*Includes 366 tons left on dock.
**Includes 399 tons lost in transit.
***Includes 569 tons lost in transit.

Recommends Lower Rates on Coking Coal

WASHINGTON, Feb. 2.— Reduced rates on coking coal moving to steelworks by-product ovens in Canton, Massillon, Cleveland, Lorain and South Lorain, Ohio, from Ohio River stations of the Wheeling & Lake Erie will be established if the Interstate Commerce Commission approves a proposed report by Examiner George M. Curtis. The examiner proposes rates named in schedules filed by the Wheeling of 95c. a ton to Canton and Massillon and $1.10 to Cleveland, Lorain and South Lorain.

The coal originates at river tipple mines on the navigable portions of the Monongahela and Allegheny rivers in the Pittsburgh and Connellsville districts of Pennsylvania and the Fairmont district of West Virginia. The examiner's proposal requires the rates be restricted to commercial coal for track delivery only and not to apply to Lake cargo coal shipments.

The schedules carried no restrictions but the Wheeling expressed willingness to apply them. The Wheeling expects to take ex-river coal out of the Ohio River from 56 to 63 miles below Conway and Colona, Pa., and haul it over its rails longer distances to Cleveland and Lorain than the Pennsylvania and Pittsburgh & Lake Erie could move it the same distances from Conway and Colona.

The commission in another proceeding found not justified a proposed rate of $1.02 on ex-river coal from Colona and Conway to Youngstown, and expressed the opinion that a reasonable maximum rate would be 77c., but it has not been published. The rates of 95c. and $1.10 over the Wheeling would widen the spread of rates on coal moving to steel users in Canton, Massillon, Cleveland, Lorain and South Lorain, as against the $1.02 rate to the Youngstown district. For this reason it is a matter of interest as to whether the 77c. rate to Youngstown will be established.

Gray Iron Foundries Had Gain in December

A slight improvement in the gray iron industry developed in December, according to the monthly trade report of the Gray Iron Institute, Cleveland. December production by foundries reporting was 37.6 per cent of normal, a gain of 0.5 per cent over November, and new business increased over 4 per cent to 30.7 per cent of normal. During the previous two years December was the lowest month both in production and new business.

A decline in production in December was reported in only one district comprising the States of Pennsylvania, Ohio, Michigan and Indiana. In that area production dropped from 38.9 per cent in November to 34.1 per cent in December. Production in New England jumped from 38.2 per cent in November to 43.7 per cent in December. Wisconsin, Illinois and the western district increased from 31.3 per cent to 36.1 per cent and the Chicago district from 40.3 per cent to 43.3 per cent.

Three foundries reported business outlook good, 27 fair, 47 poor and 35 bad.

OFF THE ASSEMBLY LINE

February Automobile Production Estimated at 175,000 Cars

DETROIT, Feb. 1.

SIGNS of a seasonal gain in the automobile industry are multiplying. Three important steel producers booked a larger volume of orders in this district in January than in the same month of 1931, while pig iron shipments to automotive consumers last month were 10 to 15 per cent better than in December. Motor car output during January was 140,000 to 150,000 units, the highest since last September. February gives promise of reaching 175,000 and March a minimum of 200,000. This will mean assembly of at least 525,000 cars in the first quarter, exclusive of what the Ford Motor Co. may do.

Never has the industry failed to show an improvement in February over January and likewise in March as against February; with manufacturers committed to conservative programs and with production actually less than retail sales in the last half of the past year, there is no reason why there should be a reversal of the traditional upward trend during the first quarter.

Larger Steel Purchases

Steel purchases at the end of January are considered a forerunner of expansion of activities on the part of several companies. The most notable order was from Fisher Body, which bought sheets and strip steel for about 40,000 Chevrolet bodies for its Cleveland plant. Reo, Oldsmobile and Willys-Overland placed small lots, while Briggs allotted initial tonnages for its refrigerator cabinet job. Then the increasing number of small orders from automobile parts makers has helped swell the total.

Attendance and interest at the various automobile shows have surpassed the most sanguine hopes of the automobile industry and have given added zest to the selling efforts of individual companies. However, executives are not inclined to let their enthusiasm overcome their judgment and consequently are still waiting to be convinced that the buying wave stimulated by the shows is not to be short-lived. One of the best omens is the demand for high-priced cars. The Lincoln plant continues to be the busiest in three years, and Cadillac has revised upward its February schedule, which now calls for 3100 cars. Packard also is doing well. These programs do not reflect merely a stocking of dealers, but retail purchases.

January motor car output estimated at 140,000 cars, February at 175,000 and March at 200,000.

* * *

Ford situation unchanged, with most suppliers still waiting for releases and new four expected about March 1.

* * *

Fisher Body has placed sizable steel order for its Cleveland plant.

Graham has shipped 3800 cars of its new series, as against 2400 in the corresponding period last year. Most of them have been eights at an average price of $1,070, representing a total of $4,066,000, compared with $2,385,000 in 1931, when sixes predominated. Graham's orders for February and March supplies are based on a production of twice as many cars as originally planned. DeSoto is understood to have put its first quarter output at a higher level than anticipated because of the unusual reception its new car has received. Auburn has as its goal 45,000 cars this year, compared with 34.000 cars last year. Chevrolet is said to have priced its present six on the basis of selling 700,000 units during 1932. Hudson-Essex is pleased at the way in which both dealers and the public have taken to its new products, which represent a radical departure in body designs from previous years. The various Chrysler-owned companies are gradually stepping up production. Briggs is expected shortly to begin manufacture of the new Plymouth body.

Ford's Rouge Plant Busy

So far as Ford is concerned, the situation is about the same as a week ago. Most suppliers still are waiting for releases, while feverish activities continue at the Rouge plant. The program apparently still calls for announcement of the new four about March 1. Ford is reported to have four open-hearth furnaces operating and is ready to put its new 400-ton furnace into production.

The foundry situation is not encouraging, largely on account of the fact that much work heretofore done outside has lately been drawn into foundries of automobile makers. For example, Oakland foundry at Pontiac is now making a considerable number of castings for Oldsmobile as well as for Pontiac cars. The Saginaw Malleable division of General Motors is pouring 500 tons of iron five days a week, now that it is handling jobs which have been "pulled in" from outside suppliers. This, of course, is beneficial in reducing General Motors' costs, but has played havoc with a number of Michigan malleable foundries which relied upon the corporation for an appreciable percentage of their business. Chevrolet's gray iron foundry is melting about 1300 tons of iron a day, four days a week. Among the independent foundries, Campbell, Wyant & Cannon at Muskegon is one of the busiest, casting 2000 brake drums a day by the centrifugal process. Another foundry, situated at Port Huron, is operating at a satisfactory rate on Chrysler and Hudson cylinder blocks.

Reconstruction Corporation Needs

By DR. LIONEL D. EDIE

EVERYBODY talks about inflation and deflation but nobody defines exactly what the words mean. That is partly because the words are not scientific terms. They are not used in economic treatises in any exact sense. Small wonder then that in the hands of newspapers and stockbrokers they have been so bandied about that they are either misleading or meaningless in everyday conversation.

Our Present Position

The present financial situation can better be comprehended by statement in more specific terms.

During the past two and one-half years, loans of commercial banks have been reduced between $9,000,000,000 and $10,000,000,000. Nearly all of this reduction has come in commercial loans and security loans. (The estimate does not include brokers' loans for account of others.) This is a reduction of about one-third of the 1929 bank credit of short term character.

The reserve base of bank credit, namely, member bank reserve balances, has in the same period declined about 15 per cent.

The monetary gold stocks of the world stand at about $11,100,000,000, an amount nearly three-quarters of a billion dollars greater than that at the beginning of the depression.

The gold stock of the United States stands at about $4,400,000,000, an amount approximately equal to the level of two years ago.

Leading banks have pursued objectives of 50 to 80 per cent individual liquidity. These have been carried out by having customers pay off loans, and by selling bonds to other banks or to private investors.

An abnormally large supply of currency has been drawn into circulation and an important result has been a sharp increase in rediscounts with Federal Reserve Banks.

Abrupt international gold movements have at times placed unusual strain upon the banking structure and upon public confidence.

Mental Attitude More Positive

During recent weeks and months the idea has gained acceptance in responsible circles that positive action is called for to bring these forces of strain and tension under control. A changed mental attitude is observable, an attitude which is averse to allowing the situation merely to drift along. Some people wish to push the whole price level back to former heights by a radical credit expansion but the more conservative groups merely desire that the wave of contraction and liquidation be arrested here. This is where we stand today, mentally and statistically, in the credit aspect of the depression. We are ready to do something about it.

In this respect, industrialists more and more realize that the credit phase of the problem is important. They face the fact that something more than unbalanced production in individual lines is involved in this struggle with depression. They sense that an unhealthy general credit situation is filtering down to their individual industries and making it practically impossible to make headway with industrial programs until the credit situation is improved.

The Reconstruction Finance Corporation should be viewed as a great experiment in trying to rescue business from the logical consequences of the credit contraction that has gone before. As an experiment, it deserves support, backing and encouragement. Also, as an experiment, it means that one may reserve judgment somewhat as to the final outcome.

The name of the enterprise is a bit misleading. Its main lines of endeavor are relief of distress, not rebuilding vital new activities to take the place of the old. A more literally accurate title would be the Rescue Finance Corporation. This is not to disparage the scope of usefulness of the new corporation but is to indicate the exact limits of its proposed activities.

In the minds of the sponsors, the new corporation is in large measure a moral gesture. They anticipate its

INTRODUCING A NEW

"LET us face the facts; we have had too much self-deception." This statement is typical of many expressions of skepticism now being voiced. It reflects an unreceptive attitude on the part of the public which will prove an obstacle to the success of the Reconstruction Finance Corporation. It bespeaks a distrust of all Governmental moves to stem the depression—a natural consequence of the failure of previous efforts and of the bad after-taste left by the ill-advised "around the corner" propaganda of 1930.

But it is one thing to be willing to face facts and another to be sure that they are facts and not half-facts or delusions. Among the so-called "facts" that have won wide acceptance are the data marshalled by many bankers and economists to show the extent to which industrial balance is still lacking. This group attributes the depression to non-monetary causes—a very convenient theory for the bankers, since it relieves them of all responsibility. It explains business reaction as being due to overproduction, tariff barriers and political disturbances, and booms as the outcome of speculative fever, consumer extravagance, technological progress and mass production. Since monetary factors are regarded as having no active part in business fluctuations, any effort to remedy defects in the operations of our credit machinery is immediately condemned as "inflation." We should face facts, we are told, and allow industrial maladjustments to cure themselves.

Dr. Lionel D. Edie, who has joined the contributing staff of THE IRON AGE, takes issue with this thesis. He adheres neither to the industrial equilibrium school, just referred to, nor to the monetary school, which ascribes economic oscillations to malad-

Federal Reserve Aid

LIONEL D. EDIE, formerly professor of finance at the University of Chicago and now vice-president of the American Capital Corpn. and of Mayflower Associates, Inc., with headquarters in New York, is an authority on problems of business, finance, money and banking. He is the author of "The Banks and Prosperity," "Money, Bank Credit and Prices," "Gold Production and Prices Since 1914," "Economics: Principles and Problems," "The Stabilization of Business" and other books. He is a graduate of Colgate University and received the degree of Doctor of Philosophy at the University of Indiana.

main benefits to be psychological. In a sense, they realize that its main chance of being of use is that it will not actually have to be used on any large scale. The publicity display runs in terms of two billions of dollars, but the cool calculations call for no such magnificent sum. After heralding the enterprise in two billion dollar terms, it is bound to be something of a let-down when the public realizes that the corporation starts out with something less than one-seventh of the promised total. Nevertheless, the real test of the psychological effects will not come until the corporation is actually making loans, and it would be premature to judge the results now.

Signals to Watch For

Inasmuch as the experimental attitude is necessary, one needs to have in mind the first signals to watch for as proof of the success or failure of the attempt. The following signals are suggested as likely to be among the earliest indications of how the process of trial and error is working out:

(a) Is much money actually being used by the corporation? Specifically, do the credit requirements exceed the initial $500,000,000 of capital which has to be put up by the Federal Government? These questions are highly significant, because if much money has to be used, that very fact will indicate that the initial psychological benefits are not as great as had been expected.

(b) Do the loans and investments of member banks continue to decline? Specifically, do the Federal Reserve reports issued weekly on Tuesdays and Fridays indicate further liquidation of bank credit? If they do, the interpretation would have to be that individual banks are still pursuing liquidity. This continuing urge for liquidity would largely counteract and nullify the good which the Reconstruction Finance Corporation might otherwise accomplish.

(c) Does currency come out of hoarding? If it does not come out of hoarding, we shall know that confidence is not being restored. Moreover, if it does not come out of hoarding, rediscounts will probably not be materially reduced and will continue to exert pressure in the direction of liquidation.

The Rediscount Argument

During recent weeks numerous authorities have urged more liberal privileges of rediscount with the Federal Reserve Banks. Some have employed the phrase, "broadening the base of Federal Reserve credit." Many schemes have been advanced looking in the direction of making new forms of securities and new types of loans eligible for rediscount. Broader eligibility has become a slogan.

This entire discussion seems to the writer to misplace the emphasis. The notion back of all such schemes is that we are going to rediscount our way out of depression. This notion

IRON AGE SERVICE

justments in money and credit. He believes that both theories are too narrow. He holds that industrial balance and monetary balance are complementary and inseparable one from the other.

Most, if not all, of the ostensibly physical factors in economic maladjustment have a monetary counterpart, he declares in his recent work entitled "Banks and Prosperity." Thus overproduction of raw materials does not occur without overfinancing of producers. Overbuilding does not occur without overexpansion of mortgage credits. War inflation and post-war deflation do not occur without corresponding gyrations of war debts.

Dr. Edie is not an inflationist. But he believes that, if facts are to be faced, the realities of monetary factors in the depression must be recognized.

Dr. Edie's contributions to THE IRON AGE will form a part of a new economic service to our readers which, although employing informative charts, will place emphasis on interpretation rather than forecasts. Aside from the fact that many complex forces—domestic and foreign, political and economic—make predictions particularly hazardous at the present time, forecasting is always subject to limitations. If accurate prophecy were possible, nothing would be left to individual initiative. Such a deterministic philosophy is at variance with experience, for history teaches that the future, to a measurable degree, is what we choose to make it.

Believing that a spirit of hope is more in harmony with American traditions than a doctrine of resignation, THE IRON AGE through its new service will *try* to help the industrial executive understand the economic forces affecting his business, and thereby assist him in shaping his future course.—*The Editor.*

is seriously out of touch with the real nature of the rediscounting process. Rediscounting means that a member bank goes into debt to the Federal Reserve. No sooner is the member bank in debt than it feels under strong moral pressure to pay off that debt to the Federal Reserve. In a period of weakened confidence member banks do not find it a badge of strength to be in debt to the Federal Reserve. Consequently, the member banks cannot be expected to take a bold initiative in credit expansion by the rediscount route. If some imperative necessity, such as currency withdrawals, or gold exports, forces rediscounting, the member banks will engage in the process. However, that is quite different from rediscounting for the purpose of facilitating a credit expansion.

General Credit Policy

The great experiment now being tried in the form of the Reconstruction Finance Corporation is, within its own limits, a hopeful and helpful undertaking but, in final analysis, its success will probably be conditioned more by the general credit policy pursued by the Federal Reserve System than by any of the detailed rescue services of the corporation itself. If Federal Reserve policy is unable to check the general contraction of credit which has been going on in recent months, the environment within which the Reconstruction Finance Corporation would have to work would be a very serious impediment to the activities of that corporation. In brief, if the new corporation is to work, it is apparently necessary that a constructive general credit policy on the part of the entire Federal Reserve System should be in operation. Such a policy is, in a sense, the prerequisite for a good outcome of the entire experiment looking toward recovery.

A short time ago, the governor of the New York Federal Reserve Bank expressed publicly the view that banking policy should henceforth be shaped to the end of turning the liquidation process around. One of the implied methods for such a purpose would be Federal Reserve open market purchases of Government bonds and bills. This would have the effect of pumping new funds into the member banks, of lowering the present burden of rediscounts and of relaxing the pressure of bank liquidations.

As yet, there are no tangible evidences that the Open Market Committee, representing all 12 Reserve Banks, has approved the policy indicated. Consequently, the public may well take the attitude of watchful waiting, pending further tangible signs of Federal Reserve buying of Governments and bills. The policy is at present in an indeterminate stage and the most definite observation to make is to point to the kind of decision which hangs in the balance and to suggest the direction in which to look for the kind of general credit policy desired.

Importance of Minor Executives Stressed at S. A. E. Meeting

The importance to industry of minor executives, especially foremen, was stressed by Gordon Lefebvre, consulting engineer and former vice-president in charge of production of the Oakland Motor Car Co., in a paper presented at the production meeting of the Society of Automotive Engineers held in connection with the society's annual session at Detroit Jan. 28.

Pointing out that battles are won in proportion to the efficiency of an army's non-commissioned officers, Mr. Lefebvre said that the rate of progress of any manufacturing establishment is in direct ratio to the efficiency of its minor executives. The average foreman represents an investment of $5000 by a company which should give at least as much attention to him as to a machine costing that amount. He should be selected wth meticulous care, should be properly trained and fairly compensated.

In choosing its minor executives, a company should establish a standard rating which should reflect the composite opinion of several high executives rather than the judgment of only one official. These men should not be appointed or dismissed without an interview with a high executive. The main trouble is that most foremen, prior to appointment, have had no training or experience in handling men. They should be taught as much as possible about the company's business with the purpose of establishing in their minds the thought that they are the general managers of their own departments. By carrying out an educational plan of this nature, a company can obtain a "golden return on a copper investment."

One of industry's difficulties, declared Mr. Lefebvre, is that in recent years things have been too easy and consequently most companies have been over-manned with subexecutives. However, when a company has an efficient organization of minor executives, it should devise a plan for retaining it during a depression. It might be possible, for instance, to put some men, such as those on time studies, on a drawing account, the remainder of their compensation depending on the company's sales volume and their individual performance. This would enable these men to count on at least a modest drawing account to tide them over a depression period.

In the discussion following Mr. Lefebvre's address, the following points were emphasized: that it pays the management to tell a foreman why a job should be done a certain way rather than let him do it his own way and then criticize him; that there should be closer cooperation between the engineering department and the shop; that many shops have too many "clockers" and not enough real time-study men; and that it often is a good idea for production executives to ask sub-foremen and even operators what they think is the best way a job should be done, as they frequently can give valuable suggestions for short cuts.

The trend toward cooperative research on the part of competing manufacturers to protect themselves against the menace of new products was described at the society's annual dinner by Maurice Holland, director of the division of engineering and industrial research of the National Research Council. He remarked that one of the alleged handicaps to cooperative research, the notorious slowness of committee activities, has been largely overcome by providing paid full-time or part-time services of executive secretaries or directors for each committee.

Fabricated Steel Plate Orders at Record Low

WASHINGTON, Feb. 2.—Orders for fabricated steel plate in 1931 totaled 302,509 net tons, according to reports received by the Bureau of the Census from 51 manufacturers. This was the lowest annual total since the bureau began its records in 1923. The 1930 commitments were 469,435 tons. Bookings in December declined to 16,442 tons, the lowest monthly record shown by the bureau reports.

The 1931 tonnage was distributed as follows: Oil storage tanks, 37,346; refinery materials and equipment, 19,950; tank cars, 3490; gas holders, 25,126; blast furnaces, 2747; miscellaneous, 213,850.

Automobile Production 2,389,730 Units in 1931

WASHINGTON, Feb. 2.—Production of motor vehicles in the United States in 1931 was 2,389,730 units, according to the Bureau of the Census. This was the lowest yearly output since 1921, when it was only 861,008, and was 154,446 less than the 1922 output. The December, 1931, production increased sharply to 121,533 from 68,867 in November. The output of last year consisted of 1,967,055 passenger cars, 416,640 trucks and 6035 taxicabs.

The Canadian production last year was 82,621, also the smallest since 1921, when it was 15,675.

...PERSONALS...

EVERETT D. GRAFF, who has been a vice-president of Joseph T. Ryerson & Son, Inc., Chicago, has been made first vice-president. ROBERT C. ROSS, formerly assistant to the president and in charge of plant operations, and HAROLD B. RESSLER, general manager of sales, have been elected vice-presidents. Robert C. Ross has been made a director.

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PAUL MACKALL, vice-president in charge of general sales, Bethlehem Steel Corpn., was elected a director of the corporation at the quarterly meeting of the board of directors Jan. 28. Mr. Mackall succeeds H. G. DALTON, of Pickands, Mather & Co., Cleveland, who resigned from the Bethlehem board.

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ROY E. WARNER has been appointed district representative in Minneapolis for the Greer Steel Co., Dover, Ohio. His territory will comprise Minnesota and northern Wisconsin.

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J. E. CASTER, who has been associated since 1916 with the Cincinnati Milling Machine Co., Cincinnati, has been appointed to manage the newly opened Pittsburgh office of that company and of Cincinnati Grinders, Inc. His first position with the Cincinnati company was as tool designer and engineering specialist. He later served as special milling machine engineering representative and in 1925 was transferred to development and sales work on Cincinnati centerless grinders. In 1929 he was named assistant sales manager of Cincinnati Grinders, Inc., and last fall was appointed manager of the Cleveland office, which position he will hold in addition to his new work. Associated with Mr. Caster in the Pittsburgh office, with headquarters at 2737 Koppers Building, will be KARL G. KECK, CARL G. LILJEBERG, R. S. HOHNHORST and E. M. LEVINE.

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M. I. DORFAN, heretofore manager of the dust collector division of the Pangborn Corpn., Hagerstown, Md., has accepted a similar position with the Blaw-Knox Co., Pittsburgh, which is entering the dust collector field with two lines of equipment developed and ready for the market and other lines in process of development.

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JAMES P. FERGUSON has been appointed assistant general manager of sales of the Reading-Pratt & Cady Co., Bridgeport, Conn., a division of the American Chain Co., Inc. He has been associated with the Reading-Pratt & Cady Co. for the past 10 years as sales engineer.

EVERETT D. GRAFF

PAUL MACKALL

E. T. BARRON, metallurgist, and J. O. LEECH, manager of the bureau of inspection and tests of the metallurgical department of the Carnegie Steel Co., Pittsburgh, have been made assistant metallurgical engineers for that company. G. ELKINS KNABLE, of the company's metallurgical department, has been appointed manager of the bureau of inspection and tests succeeding Mr. Leech.

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H. C. THOMAS, who has been director of manufacturing stocks for the Westinghouse Electric & Mfg. Co., East Pittsburgh, since September, 1929, has been appointed assistant to the general works manager of the company. He was graduated from Purdue University in 1910, and was first employed in the repair department of the Westinghouse organization. After service in the circuit breaker and switch section of the supply department, he was identified for a time with supply department sales at St. Louis. When the merchandising department was created in 1922, he was sent to New York as assistant to the manager. In 1927 he became assistant general manager of the merchandising department with headquarters at Mansfield, Ohio, and held that position until September, 1929.

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DR. MICHAEL I. PUPIN and DR. EDWIN W. RICE, JR., were presented with gold medals on Jan. 27 at the winter convention of the American Institute of Electrical Engineers. Dr. Pupin received the John Fritz gold medal in recognition of his inventions for the radio and telephone, and Dr. Rice, who is honorary chairman of the board of the General Electric Co., received the Edison gold medal for his many achievements in the development and invention of electrical devices.

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GEORGE H. BUCHER, who has recently been assistant general manager of the Westinghouse Electric International Co., New York, has been elected vice-president and general manager. He joined the Westinghouse organization in 1909 following graduation from Pratt Institute, Brooklyn, and after two years in the graduate student course at East Pittsburgh, he was transferred to the export department at New York. He was appointed assistant to the general manager of the International company in 1920, and was advanced in the following year to the position he recently held.

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FRANCIS G. ECHOLS has resigned as president of the Greenfield Tap & Die Corpn., a position he held for more than two years. Previous to that he was for 11 years vice-president and general manager. He has long been identified with the small tool industry, having spent 25 years with the small tool department of the Pratt & Whitney Co. He will continue as a member of the advisory board. CHARLES N. STODDARD, a Greenfield attorney, succeeds Mr. Echols as president.

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FREDERICK M. GILLIES, assistant general superintendent of the Indiana Harbor plant of Inland Steel Co., was seriously injured in the airplane accident which resulted in the death of Eddie Stinson.

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R. M. PATRICK, of 4271 Washington Bulevard, has been appointed St. Louis district manager of the Atlas Car & Mfg. Co., Cleveland.

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W. F. BEALL has been elected vice-president and member of the executive committee of Continental Motors Corpn., Detroit. He was formerly vice-president in charge of manufacturing of the Packard Motor Car Co.

H. L. AUSTIN (at left), the newly elected comptroller of United States Steel Corpn., succeeding W. J. Filbert, who was made vice-chairman of finance committee. Mr. Austin has been senior assistant comptroller since 1914.

A. W. VOGT (at right), who becomes senior assistant comptroller, has been with United States Steel Corpn. since its organization in 1901, and before that was with the Illinois Steel Co.

and earlier had been associated with the Brown & Sharpe Mfg. Co. and the Gray Motor Car Co.

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HORACE J. ALLEN has been appointed sales agent for the Evergreen Mines Co., Ironton, Minn., with headquarters in the Union Trust Building, Cleveland. He was formerly superintendent of the Upson blast furnace of the Bourne-Fuller Co., Cleveland, and for the past year blast furnace superintendent of the Mystic Iron Works, Everett, Mass.

OBITUARY

EMERSON K. LEWIS, formerly vice-president of the Lewis Foundry & Machine Co., Groveton, Pa., which was founded by his father, the late John L. Lewis, died at his home in Coraopolis, Pa., on Jan. 25, aged 57 years. For the last ten years Mr. Lewis had been associated with the Duquesne Steel Foundry Co., Pittsburgh, in its roll sales department, having devoted himself particularly to chilled iron rolls, on which he was considered an authority.

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JOHN F. KYES, manager and treasurer of the Reed Foundry Co., Worcester, Mass., from 1901 until 1912, and a director of the Reed-Prentice Co. of that city, died at his home there on Jan. 25. He was born in North Jay, Me., Feb. 23, 1855.

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GEORGE DEMURAS, president of the Graham Corpn., Chicago, manufacturer of electric pads and heaters, died of heart disease on Jan. 25, aged 45 years.

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WILLIAM H. FERNHOLZ, president, Wisconsin Electric Mfg. Co., Milwaukee, maker of switchboards and panels, died on Jan. 24 after a brief illness. He was born in Germany in 1884 and was graduated from Hanover University. He came to America in 1905.

LOUIS HOFFMANN, founder and president, Louis Hoffmann Co., Milwaukee, a leading sheet metal contracting concern, died on Jan. 25. He was born in Milwaukee in 1858.

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AARON J. HELFRECHT, chief engineer, Burgess Battery Co., Madison, Wis., died of pneumonia on Jan. 23, aged 40 years. He joined the Burgess company upon his graduation from the University of Wisconsin in 1915.

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ALAN F. HILTON, metallurgist, Farrell-Birmingham Co., Inc., Ansonia, Conn., died at his home on Jan. 24 after a short illness.

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FRANK C. CASE, chairman of the board and former president of Lamson & Sessions Co., Cleveland, died Feb. 1, aged 77 years. Born in West Bloomfield, N. Y., he attended Oberlin College and in 1888 became affiliated with the Lamson & Sessions Co., of which he became president in 1912. He relinquished the presidency in 1921, to become chairman of the board. He is survived by a son, George Sessions Case, now president of Lamson & Sessions Co.

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F. A. OGDEN, general freight agent, Jones & Laughlin Steel Corpn., Pittsburgh, died at his home at Crafton, Pa., on Feb. 1. He was born in Pittsburgh in 1866 and became identified with the Jones & Laughlin Company in 1889 after several years with the Baltimore & Ohio Railroad. He was widely known in traffic circles, having taken an active part in the steel industry's fight for lower rates in connection with the recent general revision which became effective last year.

Foreign Steel Rejected For Government Building

WASHINGTON, Feb. 2. — President Hoover's order to "Buy American" has resulted in the rejection of 15,000 ft. of foreign steel channels which had been delivered for use in the new House office building. The replacement material has been supplied by a domestic producer.

The foreign material was ordered removed by the office of the Capitol architect after the McNulty Brothers Co., Chicago, plastering contractor, was unable to give an affidavit that the steel it bought from a Washington jobbing house was of domestic manufacture.

Government building contracts provide that domestic steel is to be used in preference to foreign material, all things being equal. There have been reports that foreign steel was being used in some Government work, and the Concrete Steel Institute some time ago caused inquiry to be made, with the result that Federal building inspectors have been on the alert. This move to insure that only domestic steel be used was intensified by the recent order of President Hoover that domestic material is to be used exclusively in Government work, wherever possible.

Capitol buildings, however, are not 100 per cent American when it comes to steel. Several years ago foreign steel for shelving was purchased for the Library of Congress.

Iron, Steel Exports to Japan 98,886 Tons in '31

WASHINGTON, Feb. 2.—Exports of iron and steel products from the United States to Japan in 1931 totaled 98,886 gross tons, of which 48,036 tons was scrap. Other important shipments, in gross tons, were: Tin plate, 18,025; wire rods, 15,755; welded black steel pipe, 3999; steel rails, 2897; black steel sheets, 2488; casing and oil line pipe, 1937.

Stacey Mfg. Co., Cincinnati, is low bidder for a gas holder to be erected at Sunnyvale, Cal., for the Navy. It will require 1270 tons of steel. The Stacey bid was $114,487. Other bids were: Western Pipe & Steel Co., San Francisco, $117,852; Steel Tank & Pipe Co., Berkeley, Cal., $118,900; McClintic-Marshall Corpn., $118,970.

December Iron and Steel Exports Smallest for Any Month Since 1905

WASHINGTON, Jan. 26.—Declining 53 per cent, or 1,016,717 gross tons, exports of iron and steel products from the United States in 1931 totaled only 965,268 tons, against 1,981,985 in 1930. Exports in December, 1931, dropped to 57,263 tons. This was the lightest monthly shipment in the foreign trade since January, 1905. The December movement was 2293 tons below that of November.

The 1931 export movement represented only 3.9 per cent of the ingot production. The 1930 export movement was 5.05 per cent of the ingot output.

Import figures for December, 1931, and for the year have not been completed by the Iron and Steel Division, Department of Commerce.

Exports from United States by Countries of Destination

(In Gross Tons)

	Steel Plates				Galvanized Sheets				Black Steel Sheets			
	December		12 Months Ended December		December		12 Months Ended December		December		12 Months Ended December	
	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930
Canada	607	3,377	34,944	77,032	678	1,011	4,787	18,575	2,456	14,665	51,028	94,385
Japan	....	....	27	1,023	105	....	565	2,198	128	227	2,488	7,895
Cuba	60	2	197	1,473	191	252	2,053	4,524	8	23	220	683
Philippine Islands	119	63	2,753	1,577	1,161	680	6,002	20,864	....	53	785	2,593
Mexico	33	170	679	1,392	75	327	808	5,040	88	107	1,718	2,592
Argentina	....	....	....	....	10	128	2,169	2,103	2,650	885	8,360	5,142
Chile	....	....	....	....	21	....	....	890	....	1,741	1,501	3,861
Colombia	....	....	....	....	209	292	2,200	2,935	46	12	207	476

	Steel Rails				Barbed Wire				Plain and Galvanized Wire			
	December		12 Months Ended December		December		12 Months Ended December		December		12 Months Ended December	
	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930
Canada	1,519	1,267	9,871	14,247	....	1	1,337	2,506	90	134	2,111	6,250
Japan	52	....	3,105	5,146	....	....	....	....	....	19	196	521
Cuba	....	73	604	5,443	74	115	1,416	2,642	73	71	554	1,131
Philippine Islands	....	....	2,674	3,929	....	....	998	1,160	28	45	316	442
Mexico	4	112	148	967	89	187	1,431	5,631	38	111	778	1,639
Argentina	....	....	806	3,205	395	430	3,362	5,794	288	567	3,204	7,053
Chile	....	....	631	27,693	....	....	....	2	70	8	65	180
Colombia	....	....	30	3,223	179	180	2,074	1,634	....	....	605	....
Brazil	1,877	533	5,770	4,839	457	316	929	2,285	....	84	613	825

	Tin Plate				Steel Bars				Plain Heavy Structural Material			
	December		12 Months Ended December		December		12 Months Ended December		December		12 Months Ended December	
	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930
Canada	83	73	3,763	60,359	366	1,273	1,453	37,628	3,743	6,509	78,481	93,316
Japan	1,874	1,481	18,070	46,646	46	....	121	2,436	29	....	234	3,715
Cuba	163	337	2,395	4,822	11	73	61	1,944	16	86	416	2,216
Philippine Islands	....	....	....	....	....	....	....	....	....	....	....	....
Mexico	206	626	8,924	11,695	9	64	92	1,095	206	....	582	1,284
Argentina	560	1,730	7,113	11,923	3	9	5	528	560	121	665	1,486
Chile	136	332	1,633	5,371	72	....	535	5,275	136	157	3,627	2,181
Brazil	138	148	3,728	2,231	12	....	46	669	138	....	171	....
China	267	778	1,312	18,750	352	....	627	....	....	....	....	....
India	....	170	9,006	10,655	....	....	....	....	....	....	....	....
United Kingdom	....	....	....	....	1,569	306	7,305	9,663	....	....	....	....
Italy	....	....	....	7,513	....	....	....	....	....	....	....	....

Exports of Iron and Steel from the United States

(In Gross Tons)

	December		12 Months Ended December	
	1931	1930	1931	1930
Pig iron	406	474	6,719	13,671
Ferromanganese	53	....	1,306	6,189
Scrap	5,973	11,132	135,900	358,466
Pig iron, ferroalloys and scrap				
Ingots, blooms, billets, sheet bar	92	319	7,965	17,032
Skelp	2,265	3,248	56,496	119,884
Wire rods	2,162	3,013	32,074	39,777
Semi-finished steel				
Steel bars	2,605	2,932	42,513	81,090
Alloy steel bars	88	435	2,968	6,668
Iron bars	30	128	1,016	1,823
Plates, iron and steel	1,216	4,396	42,472	98,339
Sheets, galvanized steel	3,471	4,799	48,190	87,222
Sheets, galvanized iron	235	234	4,267	6,268
Sheets, black steel	6,324	19,088	87,217	137,918
Sheets, black iron	378	714	5,530	11,482
Hoops, bands, strip steel	1,616	1,824	28,233	39,316
Tin plate; terne plate	5,820	8,760	84,549	216,087
Structural shapes, plain material	4,368	7,515	90,061	140,415
Structural material, fabricated	1,692	6,462	30,830	103,471
Tanks, steel	488	863	12,428	20,490
Steel rails	4,137	2,546	33,418	95,227
Rail fastenings, switches, frogs, etc	366	1,085	8,073	19,517

	December		12 Months Ended December	
	1931	1930	1931	1930
Boiler tubes	346	765	7,071	14,685
Casing and oil-line pipe	1,008	4,160	21,938	62,104
Pipe, black and galvanized, welded steel	3,919	4,418	55,229	79,235
Pipe, black and galvanized, welded iron	366	427	5,385	14,164
Plain wire	978	1,681	14,139	26,463
Barbed wire and woven wire fencing	1,630	1,848	23,812	39,119
Wire cloth and screening	47	84	1,226	1,583
Wire rope	180	270	2,499	4,536
Wire nails	1,161	612	8,838	8,472
Other nails and tacks	356	495	3,817	5,867
Horseshoes	4	5	152	180
Bolts, nuts, rivets and washers, except track	284	693	4,856	10,131
Rolled and finished steel				
Cast iron pipe and fittings	1,251	2,058	21,059	31,474
Malleable iron screwed fittings	251	903	4,509	10,743
Car wheels and axles	583	1,227	6,395	14,841
Iron castings	230	589	4,316	6,613
Steel castings	64	314	3,104	9,389
Forgings	306	586	7,393	8,467
Castings and forgings				
All other	514	890	7,305	13,576
Total	57,263	101,992	965,268	1,981,985

• • EDITORIAL

Finance Body Hampered by Propaganda

NOT the least of the difficulties confronting those who will direct the operations of the Reconstruction Finance Corporation is the most dangerous propaganda this country has had to deal with since the war. We refer to French insinuations, aided and abetted by the pronouncements of some misguided American economists, that the corporation is an instrument of inflation and a harbinger of departure from the gold standard.

To show how unwarranted these intimations are it is only necessary to quote from such conservative authorities as the *Financial Chronicle* and the business bulletin of the National City Bank of New York. Says the *Chronicle*, concerning the gold standard:

> We have no hesitation in saying that if all the foreign banks withdrew every dollar of the gold they have on deposit in the United States the country would still rest securely on the gold basis.

Referring to the inflation bugbear, the bank bulletin points out that the French Government itself set precedents for what the Finance Corporation proposes to do. In September it joined with the principal Paris banks in forming a guarantee fund to enable the Banque Nationale de Crédit, one of the largest deposit banks in France, to continue operations. More recently, it gave emergency aid to the Bank of France by making good losses sustained on funds in London through the depreciation of sterling.

It is time to call a halt, in this country at least, to loose talk endangering the success of an imperative emergency undertaking. It should be apparent to all clear-thinking Americans that extraordinary measures are necessary to cope with a condition that may well be described as creeping paralysis of our banking operations.

Rail Wage Agreement

THE wage cut agreement between the railroad executives and the railroad labor representatives should substantially relieve the critical situation in which our carriers find themselves financially. Under it, railroad operating costs will be cut approximately $210,000,000 during the ensuing year.

There has been considerable speculation as to the use that will be made of the additional income represented by this diminished outgo and by the increased revenue from recent rate increases, estimated at $100,000,000 annually. Some expect it to be reflected in equipment buying for rehabilitation of impaired physical assets; others may look for its reflection in dividend policies, while still others expect a strengthening of railroad employment quotas.

In all probability, the immediate application will be toward the financing of prior obligations of an immediate nature, such as notes and bond interest payments. However, by the consequent strengthening of railroad credit, this may well be the cause of the other expectations being also achieved in turn. Incidentally, life insurance companies and savings banks which have heavy investments in railroad bonds will find themselves in better position.

Our railroads still constitute the most important part of our business vertebræ and anything that will stiffen America's business backbone will eventually benefit all of us.

Loosening the Anti-Trust Laws

EVER since the Sherman act was passed 42 years ago, business has sought liberalization of it and other anti-trust legislation. These laws have been described as antiquated, hampering to business, and out of step with modern technique in producton and merchandising. High official sources have given sympathetic ear to these contentions, and have recommended relief. President Hoover has asked Congress to inquire into them with a view to liberalization especially for the raw resources industries. It is known that many members of Congress are responsive to the suggestion.

Two bills purporting to ease the situation are now before Congress. One is a joint measure introduced in the House and the Senate by Representative Kelly and Senator Davis of Pennsylvania. The other is the bill of Senator Norris of Nebraska.

The Kelly-Davis bill proposes a Bituminous Coal Commission. It would permit coal operators to organize marketing pools and selling agencies and arrange price schedules. Every operator would have to get a license from the commission. Complaints concerning price could be made by any source. This apparently means Government price enforcement. Moreover, in return for freedom from the anti-trust laws, operators would be compelled to recognize the right of collective bargaining.

The Norris bill gives a wide range of "rights" to organized labor in case of strikes and restricts the power of the judiciary to issue injunctions.

The belief appears to be growing, in industry and business, that it will be well to move slowly in the matter of anti-trust law revision. One reason is that conditions are not now propitious for legislative experiment in the

COMMENT • •

field of economic policy. Another is that perhaps the administrative attitude toward these existing laws needs revision more than the laws themselves.

Steel and Automotive Performance

THE largest steel producer had a total deficit of nearly fifty million dollars last year, while the largest automobile manufacturer, also one of the largest users of steel, earned $0.201 a share on its common stock. Relative to its capacity, the automobile industry did not operate at a better rate last year than did the steel industry.

The obvious deduction might be that the automobile plant had adjusted itself to reduced volumes more quickly than the steel plant. This, while true, is no measure of the relative efficiency of the managements. For it is equally true, though less obvious, that complex industrial operations have more opportunity for adjustment and retrenchment than do the simpler and more basic ones. The profitable volume range in the steel-producing industry will probably of necessity always be represented by a smaller percentage of total capacity than in the steel-consuming industries.

A Long Wait For a Big Job

THERE is a "metal that talks," according to one of the research narratives issued by the Engineering Foundation, New York. As one sits before the radio listening to the faithful reproduction of music the feeling is that the air or ether is the chief factor in this marvelous modern success. The truth, however, is that "a certain metal, sealed tight in tubes, puts the wave on the air and then, in different tubes, recaptures it so as to be turned back into music or words." This metal is molybdenum. Today thousands of miles of molybdenum wire are being used in the radio industry—wire made of a metal which has been known for nearly 150 years but a negligible factor in industry until quite recently.

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COMPARATIVELY sharp reductions in the prices of certain forms of sheet and strip steel in the last two months have again emphasized the far-reaching effects of the continuous mill in flat rolled steel production. When continuous mills first began to operate, their exponents emphasized their need for heavy tonnage if profits were to be made. In 1928 and 1929 large orders were to be had frequently and the advantage of continuous production was brought out under the most favorable conditions.

The last two years have tested the versatility of the continuous process, and the results have apparently been favorable. One large installation is reported to have shown a considerable profit last year, with an average operation of less than 40 per cent. To reach this figure it was necessary to turn out many comparatively small orders on the mill.

A Good January Start

IF data on the distribution of finished steel products by industries were available for January, the automotive group would certainly be in the lead. This industry was the No. 1 consumer of steel products during 1928 and 1929, but in the last two years has been forced into second place by building and construction.

None of the great American industries distributes the benefits of activity more widely than the automotive. The anxiety of steel makers to share in this business is constantly demonstrated by their willingness to shade prices when contracts are about to be placed in Detroit. While some of these orders may not result in profits for the steel industry, they may be the beginning of backlogs on which the industry may gradually regain its equilibrium. And if the experience of the steel industry with respect to automotive requirements holds true with the industries which depend upon the motor car companies for a large part of their business, the year may be beginning rather auspiciously.

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A MEMBER of the editorial staff of THE IRON AGE who recently visited some fifteen or twenty manufacturing plants in various metal-working lines noted almost universal comment that selling prices had reached a ridiculously low level. This opinion applied not only to the prices of the consumer products made by these companies but equally to the prices of materials bought by them. Steel company executives who are presenting their 1931 annual reports to their stockholders doubtless entertain the same opinion.

Many users of materials who presumably are beneficiaries of the low prices quoted them are really deriving no benefit at all, for their own customers demand equal or even greater reductions on the products made from them.

British Steel Manufacturers Ask for Tariff Protection

Industry in Serious Position, They Say, in Appeal to Board of Trade —Continental Prices Lower

LONDON, ENGLAND, Feb. 1 (*By Cable*).—The Government tariff announcement is expected Thursday. Meantime, manufacturers of steel representing 70 per cent of the British output have sent a memorandum to the Board of Trade asserting that the position of the steel industry here is very serious. Steel manufacturers have requested moderate protection of the home market and the discontinuance of foreign dumping.

The markets are more hopeful. Operations of tin plate mills are above 60 per cent, and the outlook is favorable for further good sales to America and the Far East. The output regulation plan is yet unformed. German and French canners are inquiring for sites in England for canneries.

Continental steel gold prices have weakened on renewal of competition, which has followed the failure of the establishment of sales cartels. However, there are hopes for a favorable solution.

Germany is seeking anti-dumping duties on British, Belgian and Swedish material, but consumers are protesting.

The Polish company, Konigshutte and Laurahutte, has booked Bulgarian rails of the value of about $780,000, and Bismarckhutte has booked an order for 7-in. tubes from Argentina.

Russia's second five-year plan provides for an annual output by 1937 of 220,000,000 tons of coal and 22,000,000 tons of pig iron.

There are unconfirmed reports that the Youngstown Sheet & Tube Co. is negotiating for the erection of a steel plant in Lancashire.

British Prices, f.o.b. United Kingdom Ports

	Per Gross Ton	
Ferromanganese, export	£9 0s.	
Billets, open-hearth	5 7½	to £5 12½s.
Black sheets, Japanese specifications	9 7½	to 9 10
Tin plate, per base box	0 14 3d	to 0 14 9d
Steel bars, open-hearth	7 17½	to 8 7½
Beams, open-hearth	7 7½	to 7 17½
Channels, open-hearth	7 12½	to 8 2½
Angles, open-hearth	7 7½	to 7 17½
Black sheets, No. 24 gage	8 0	to 8 10
Galvanized sheets, No. 24 gage	9 10	to 10

Continental Prices, f.o.b. Continental Ports

	Per Metric Ton, Gold £ at $4.86
Billets, Thomas	£2 8s. 6d.
Wire rods, No. 5 B.W.G.	5 5
Black sheets, No. 31 gage, Japanese	11 5
Steel bars, merchant	2 14
Beams, Thomas	2 13
Angles, Thomas, 4-in. and larger	2 13
Angles, small	2 15
Hoops and strip steel over 6-in. base	3 15
Wire, plain, No. 8	5 7½
Wire, barbed, 4-pt., No. 10, B.W.G.	8 15

Pig Iron Freight Rate Change Is Proposed

Abandonment of the present method of fixing freight rates on pig iron in the Central territory has been proposed by the railroads of the Central Freight Association, which have made application to place proposed changes in effect. Rates at present are fixed by a method of grouping plants of consumers and producers and the rates are not determined by the length of haul. The railroads propose to substitute mileage schedule rates fixed at 65 per cent of the rates for basic iron and steel products between the same points. The rates would apply on all shipments for distances greater than 50 miles.

The change, it is stated, would result in a rate advance on all pig iron shipments for distances covered by the proposed change. While the increase would not be much on hauls slightly over 50 miles, it would be increased to $2.33 for a 100-mile haul. A date for a hearing on the proposed change has not yet been set. Vigorous protest against the change will be voiced by pig iron producers and the matter probably will be carried to the Interstate Commerce Commission.

A Chromium-Vanadium Nitriding Steel

A new nitriding steel containing chromium and vanadium, developed by the Union Carbide & Carbon Research Laboratories, Inc., is said to have many of the physical properties found in the S.A.E. 6100 series of steels. Chrome-vanadium nitriding steel contains from 0.50 to 2.50 per cent chromium, from 0.30 to 2.00 per cent vanadium, and from a very low percentage up to 0.70 per cent carbon, depending upon the physical characteristics desired. It can be manufactured according to well-established plant technique.

Investigation has shown that the presence of vanadium in an unbound form, that is, not combined as a carbide, is important in securing surface hardening with nitrogen. About 0.30 per cent vanadium in excess of that required for the formation of vanadium carbide is necessary so that, as the carbon content is varied, the vanadium content must be changed accordingly. The presence of vanadium greatly refines the grain of the base metal without increasing its hardness so that a tough, strong, easily machinable base alloy can be used which at the same time can be rapidly surface hardened at a relatively low temperature.

Ammonia nitriding is recommended by the company as giving the best results, particularly where a comparatively heavy case is required. A case as thick as 0.04 in. can be obtained by this method. The duplex cyanide treatment, however, is entirely satisfactory if a thin, but extremely hard, case is desired.

The properties and advantages of this alloy steel are discussed in detail in a new booklet issued by Electro Metallurgical Co. as Technical Bulletin No. CV-1, "Chrome-Vanadium Nitriding Steel."

C. W. Heppenstall Heads Forging Manufacturers

The Forging Manufacturers' Association, at its annual meeting in New York on Jan. 15, elected the following officers for 1932: C. W. Heppenstall, Heppenstall Co., Pittsburgh, president; R. F. Devine, Jr., Erie Forge Co., Erie, Pa., and C. E. Wilder, National Forge & Ordnance Co., Irvine, Pa., vice-presidents, and C. E. Finkl, A. Finkl & Sons Co., Chicago, treasurer.

Corporation Offers Stock to Employees at $40

The finance committee of the United States Steel Corpn., in accordance with the company's stock subscription plan, has offered to employees of the parent and subsidiary organizations the privilege of subscribing to 200,000 shares of common stock at $40 a share.

Steel Barrel Output in 1931

WASHINGTON, Feb. 2.—Totaling 5,984,975 units, and representing 35.8 per cent of capacity, the output of steel barrels in 1931 was the lowest since 1924, when it amounted to 4,725,604 barrels. The 1930 output was 7,435,891 barrels. The output in December was 382,483; the smallest since February, 1924, with a total of 370,966.

Miller & Co. is the new name for Nicholas & Miller, Chicago pig iron brokers. Headquarters will remain in the McCormick Building.

Pig Iron and Steel Ingot Production Fail to Show Seasonal Increase

Blast Furnace Output in January Off Fractionally From December—Steel-Making Rate Declines This Week

ALTHOUGH steel ingot production is believed to have made a slight gain in January over December, pig iron output failed to increase, having, in fact, decreased 0.8 per cent, but apparently this loss was caused by a decline in merchant iron which offset a minor improvement in the steel-making grades.

Steel ingots and pig iron do not always move in unison, as recently as last November there having been a gain in steel ingots of 8 per cent against a 3 per cent reduction in pig iron.

THE IRON AGE estimate of January pig iron output is 972,784 gross tons, or 31,380 tons a day, against 980,376 tons, or 31,625 tons a day, in December. The loss in production occurred despite a net gain of five active furnaces during the month, indicating that some furnaces operated with the blast slowed down. On Feb. 1 there were 61 furnaces in blast, against 56 on Jan. 1.

THE pig iron figures and this week's reports on steel-making operations are evidence of the absence of the usual seasonal recovery. In January, 1931, pig iron production gained 3 per cent, with a 12 per cent rise in steel-making iron, and ingot output advanced 19 per cent. The current steel ingot rate for the entire country has declined to 28 per cent from 29 per cent last week.

There are sharp distinctions, however, in activity. At least three plants in the country are running at 50 per cent or higher, yet there has been a decline in the Pittsburgh district to 22 per cent, and the mills in the Valleys are also on a lower basis of output. Some steel companies last month sold less steel and shipped less than in December, while others had fairly good gains.

Steel companies with the best operations are benefiting to a greater extent than others from automobile business. Expansion in electric refrigerator manufacturing has also aided one or two sheet mills. The automobile industry is expected to produce 175,000 cars in February, against about 140,000 for January. If the Ford Motor Co. gets into volume production before the end of this month, the total will be raised. Though Ford has not yet placed large steel orders, some are expected within a few weeks. Steel has been bought for 40,000 Chevrolet bodies.

THE railroad wage adjustment raises hopes that there will be an increase in purchases by the carriers. Some rails and repair material probably will be bought, but major programs are likely to be postponed until the last half of the year. Many roads have carried over unused rails from last year, which will materially reduce their new purchases. The New York Central, for example, may buy only 46,000 tons, against about 170,000 tons for 1931. The Nickel Plate has inquired for 17,000 tons, a reduction from last year's quota, the Interborough Rapid Transit Co. of New York has ordered 9500 tons, the Santa Fe has ordered 6000 tons of tie plates and the Erie will also buy a quantity.

Meanwhile, renewed pressure has been brought to bear by some roads on the rail price, which has remained at $43 since 1922. It is said that a reduction of $3 a ton is sought.

NO early increase in building activity is indicated by current inquiries. A movement in many cities to reduce building trades wages may ultimately have a stimulating effect, but until such adjustments are made prospective work will naturally be delayed.

Instead of the usual increase at this season in tin plate rollings, there has been a decline to about 35 per cent of capacity. The markets on the Atlantic and Pacific seaboards have been disturbed by sales of Welsh plate at delivered prices $1 or more per base box below American official quotations. The depreciated pound sterling has also permitted the importation of 20,000 tons of English pig iron at a low price by a Delaware River cast iron pipe maker.

FURTHER price concessions have occurred on sheet steel. Automobile body sheets are off $2 a ton to 2.80c. a lb., Pittsburgh, galvanized sheets are being freely sold at 2.75c., with some mills having quoted the Pennsylvania Railroad 2.70c., and light cold-rolled sheets are also $2 a ton lower. Sheet bars have had a further decline of $1 a ton. Barrel makers have secured concessions from 2.15c., Pittsburgh, on No. 24 hot-rolled annealed material. Base prices on stainless steel in all forms have been changed, involving a readjustment of differentials.

Price declines of the week are not reflected in THE IRON AGE finished steel composite, which remains at 2.037c. a lb. Pig iron is also unchanged at $14.65 a ton, while larger sales of steel scrap at Pittsburgh have not strengthened that market. The scrap composite is still at its all-time low of $8.33 a ton.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Feb. 2, 1932	Jan. 26, 1932	Jan. 5, 1932	Feb. 3, 1931
No. 2 fdy., Philadelphia	$15.64	$15.64	$15.64	$17.76
No. 2, Valley furnace	15.50	15.50	15.50	17.00
No. 2 Southern, Cin'ti	13.82	13.82	14.82	14.19
No. 2, Birmingham	11.00	11.00	12.00	13.00
No. 2 foundry, Chicago*	16.50	16.50	16.50	17.50
Basic, del'd eastern Pa.	16.25	16.25	16.25	17.25
Basic, Valley furnace	15.00	15.00	15.00	17.00
Valley Bessemer, del'd P'gh.	17.89	17.89	17.89	19.26
Malleable, Chicago*	16.50	16.50	16.50	17.50
Malleable, Valley	16.00	16.00	16.00	17.50
L. S. charcoal, Chicago	23.17	23.17	23.17	27.04
Ferromanganese, seab'd carlots †	75.00	75.00	75.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.,

Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh	27.00	27.00	28.00	30.00
Sheet bars, Pittsburgh	*26.00*	27.00	28.00	30.00
Slabs, Pittsburgh	27.00	27.00	28.00	30.00
Forging billets, Pittsburgh	34.00	34.00	35.00	36.00
Wire rods, Pittsburgh	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.50	1.50	1.50	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.50	1.50	1.50	1.65
Bars, Chicago	1.70	1.70	1.60	1.75
Bars, Cleveland	1.55	1.55	1.55	1.70
Bars, New York	1.85	1.85	1.85	1.98
Tank plates, Pittsburgh	1.50	1.50	1.50	1.65
Tank plates, Chicago	1.70	1.70	1.60	1.75
Tank plates, New York	1.798	1.798	1.798	1.93
Structural shapes, Pittsburgh	1.50	1.50	1.50	1.65
Structural shapes, Chicago	1.70	1.70	1.60	1.75
Structural shapes, New York	1.76775	1.76775	1.768	1.90½
Cold-finished bars, Pittsburgh	2.00	2.00	2.00	2.10
Hot-rolled strips, Pittsburgh	1.40	1.40	1.45	1.55
Cold-rolled strips, Pittsburgh	1.90	1.90	1.95	2.25

Finished Steel

Per Lb. to Large Buyers:	Feb. 2, 1932 Cents	Jan. 26, 1932 Cents	Jan. 5, 1932 Cents	Feb. 3, 1931 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.15	2.15	2.25	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.30	2.30	2.40	2.45
Sheets, galv., No. 24, P'gh	*2.75*	2.80	2.80	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.90	2.90	2.90	3.00
Hot-rolled sheets, No. 10, P'gh	1.60	1.60	1.60	...
Hot-rolled sheets, No. 10, Chicago dist. mill	*1.70*	1.75	1.75	...
Wire nails, Pittsburgh	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh	$4.75	$4.75	$4.75	$5.00

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	$10.25	$10.25	$10.12½	$13.00
Heavy melting steel, Phila	7.50	7.50	7.50	10.50
Heavy melting steel, Ch'go	7.25	7.25	7.75	10.12½
Carwheels, Chicago	7.50	7.50	8.50	10.50
Carwheels, Philadelphia	10.50	10.50	11.50	13.50
No. 1 cast, Pittsburgh	10.00	10.00	10.00	12.50
No. 1 cast, Philadelphia	10.00	10.00	10.00	12.00
No. 1 cast, Ch'go (net ton)	7.50	7.50	8.50	9.50
No. 1 RR. wrot., Phila	8.50	8.50	9.50	12.00
No. 1 RR. wrot., Chigo (net)	6.50	6.50	6.50	8.00

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt	$2.25	$2.25	$2.25	$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	*6.87½*	7.62½	7.37½	9.87½
Electrolytic copper, refinery	*6.50*	7.12½	7.00	9.50
Tin (Straits), New York	*22.25*	22.35	20.75	25.25
Zinc, East St. Louis	*2.85*	2.95	3.12½	4.10
Zinc, New York	*3.22*	3.32	3.47½	4.45
Lead, St. Louis	3.55	3.55	3.55	4.40
Lead, New York	3.75	3.75	3.75	4.60
Antimony (Asiatic), N. Y.	**7.25**	6.00	6.15	7.12½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Feb. 2, 1932	2.037c. a Lb.	$14.65 a Gross Ton	$8.33 a Gross Ton
One week ago	2.037c.	14.65	8.33
One month ago	2.052c.	14.81	8.47
One year ago	2.142c.	15.90	11.33
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1931	2.142c., Jan. 13	2.052c., Dec. 29	$15.90, Jan. 6	$14.79, Dec. 15	$11.33, Jan. 6	$8.50, Dec. 29
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 5
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

Pittsburgh and Valley Operations Decline From Late January Rate

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PITTSBURGH, Feb. 2.—In the face of gloomy reports of current orders and operations in the district, sentiment among local steel officials has improved in the last week. While no important change is expected, it is believed that such outside factors as the inception of the Reconstruction Finance Corpn., the adjustment of wage rates by the railroads and in the building industry, and the promised resumption of activity by the Ford Motor Co. will bring some impetus to the steel industry during February or in early March.

Finished steel releases during the last week declined in the aggregate, and production schedules of a number of companies have been scaled down. Ingot output in the district has dropped to 22 per cent of capacity, with lower rates reported by the larger interests, as well as by the smaller independents. As schedules during the last half of January had been based upon the expectation of seasonal expansion in demand, the failure of orders to come in has forced the recent curtailment in the Pittsburgh district. Raw steel production during January fell somewhat under that of December with a number of producers. Valley makers, who enjoyed the full benefits of automobile releases last month, have also been forced to curtail production, the current rate having fallen to less than 30 per cent. Output of sheet and strip mills in that territory is slightly higher. The Wheeling district steel production steel averages 50 per cent of capacity, with one large producer bettering this rate slightly.

Steel prices are holding in a general way, although exception must be made in the case of finishes of sheets going to the automobile industry, as well as on galvanized material. Price weakness also persists in the tin plate market, and output of this commodity continues to drop. In spite of light orders for most all forms of steel, the need of tonnage seems to be governing quotations on even comparatively small orders. Semi-finished steel is still weak, reflecting the low prices now being made by sheet and strip makers.

Pittsburgh district ingot output drops to 22 per cent; Valleys at 30 per cent or less. Wheeling district operations remain at 50 per cent.

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Some improvement in business expected to develop during February or in early March.

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Price structure still weak, especially on semi-finished steel and sheets.

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Steel scrap prices hold in transactions of more than 10,000 tons.

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Pig Iron

A little tonnage has been placed in the last week, and aggregate sales have been augmented by the placing of a comparatively large order by a nearby radiator maker. Otherwise, the market is as dull as it has been, as most of the smaller users of foundry pig iron in the district are ordering out little or no material. A Johnstown, Pa., consumer is inquiring for 1000 tons of low phosphorus iron, the sale of which is expected to clarify the price on this grade. Other prices are nominal and unchanged.

Semi-Finished Steel

While little new buying is reported, a few small purchases have weakened the market further, particularly on sheet bars, which have been sold in the Valleys at as low as $26, and this quotation now seems to be rather general. Billets and slabs are holding at $27, Pittsburgh, and forging billets are nominal at $34. The wire rod price seems to be rather firm at $37, although consumers are pressing for concessions whenever possible.

Rails and Track Accessories

While the final settlement of the wage controversy between the carriers and the labor unions has not yet had any visible effect upon buying of steel, the outlook is greatly improved and inquiries for the usual supplies are expected to come out before the end of the month. The Nickel Plate has issued an inquiry for 17,000 tons of rails.

Bolts, Nuts and Rivets

The market continues very quiet, although orders from the automobile industry have been a little heavier in the last week or two. Railroad purchases are negligible, and the building industry is doing practically no buying. Prices are very weak, but not quotably lower.

Tubular Goods

The pipe business continues very quiet, although standard pipe will undoubtedly benefit by wage adjustments in the building trades. This line has been particularly dull since the first of the year, but distributers' stocks are low and must soon be replaced to prepare for spring business. The line pipe market is dormant, but plans are said to be going forward on a number of outstanding projects. Many of the pipe making units in this district and in the Valleys are idle, and others are running from one to two days a week. Mechanical tubing and boiler tubes are a little more active than they have been.

Bars, Plates and Shapes

While January tonnage in the heavy hot-rolled products fell behind that of December with some makers, prospects for improvement have been greatly enhanced by progress in wage adjustments by leading consuming industries. Although the decrease in railroad wages is not expected to release funds for car buying by the carriers, it is hoped that repair activity will get under way on a large scale in the early spring.

Efforts being made to reduce wages in the building trades are also meeting with success in various parts of the country. The Building Trades Employers' Association at Pittsburgh has ordered a 25 per cent wage reduction, effective Feb. 1, following several weeks of unsuccessful negotiations with the unions. Although this may halt activity on such projects as are now under way in the district, it will doubtless result in a clarification of conditions. No new construction jobs of importance have come out in the last week, although plans have been announced for a 33-story hotel building in Pittsburgh, which will probably take a considerable tonnage of structural steel. Shipments of reinforcing bars for spring road work are beginning, and some new inquiry is appearing. Fabrication of structural steel for Radio City in New York will be begun in a large way during the next month or six weeks,

and shipments on other large projects will soon begin to increase.

The prospect for buying of river craft has been improved by unfavorable action in Washington on the Johnson bill, which was generally considered detrimental to river traffic in the Pittsburgh district. A local company has placed 12 covered cargo barges, requiring 1700 tons of plates and shapes, and other orders are now believed to be near.

No change in the price situation is reported, with local makers of bars, plates and shapes adhering to a range of 1.50c. to 1.60c., Pittsburgh.

Wire Products

Specifications for merchant products have been light in the last week, as jobbers were well stocked prior to the recent price adjustment. However, prices seem to be holding on such orders as are coming in, with nails well maintained at $1.95 a keg, Pittsburgh. Shipments of manufacturers' wire during January showed an improvement over December, but the gain was not notable. The price is holding at 2.20c., Pittsburgh.

Sheets

Releases have not gained significantly, but recent demand has been well maintained. The automobile industry is still responsible for a large part of the tonnage going to nearby mills, but an improvement in demand for electrical sheets is reported by one or two makers. Buying by other consuming groups is still very light and limited to minimum operating requirements. Operating schedules are still improving, and are now just a shade under 30 per cent.

The American Stainless Steel Co. has announced a change in base on corrosion resisting sheets, requiring an adjustment, but no advance in the selling price of this product. This affects all of its licensees. Sheet prices generally are still rather weak, with concessions reported most frequently in the Detroit territory. Auto body sheets are now available from most makers at 2.80c., Pittsburgh, and light cold-rolled are being sold down to 2.65c., Pittsburgh. Galvanized material is being shaded $1 to $2 a ton in many consuming districts, particularly along the Atlantic seaboard. The market on hot-rolled annealed sheets has declined rather generally to 2.15c., Pittsburgh, and even this price has been shaded to barrel makers.

Tin Plate

Production continues to decline slightly, and is estimated this week at about 35 per cent of capacity. Sentiment at the National Canners' convention in Chicago last week was not particularly encouraging, and one or two of the larger container manufacturers are still hesitant about allocating their 1932 tonnage. Price shading continues, although the official quotation is unchanged at $4.75 a base box, Pittsburgh.

Strip Steel

Orders have shown some improvement in the last week, having been aided by the placing of a little tonnage by the Ford Motor Co. The other automobile companies are not increasing their specifications, and some of them have curtailed releases slightly. Hot strip mills are running at about 25 per cent of capacity, and cold-rolling units at a slightly lower rate. Prices are holding, except in one or two instances. The market on hot-rolled strip, 6 in. and narrower, ranges from 1.50c. to 1.55c., Pittsburgh, with the wider material taking the usual differential. Cold-rolled strip ranges from 1.90c. to 2c., Pittsburgh.

Coal and Coke

Colder weather is improving demand for heating coke, although dealers are fairly well stocked and are not yet beginning to place much additional tonnage. Foundry coke is quiet, and sales of the furnace grade are negligible. The coal market is slightly more active, particularly on the domestic grades.

Old Material

Fairly substantial purchases of No. 1 heavy melting steel by one consumer during the week have reaffirmed present market prices. Quotations of $10.25 and $10.50 for the same points named earlier in January again secured this business, which is said to have amounted to well over 10,000 tons. No other consumers are buying, but a few are still taking shipments, and little surplus scrap is available in the district. Dealers are paying at least $10 to cover on most orders, and higher figures are named occasionally. A hold-up has been instituted at one important consuming point, but another consumer is taking shipments more freely. The other grades of scrap are very dull, and no sales are reported to change recent prices.

St. Louis Pig Iron Sales Show Some Increase; Missouri-Kansas-Texas Buys 2800 Tons of Rails

ST. LOUIS, Feb. 2.—There was some improvement in sales of pig iron during the last week. Southern iron predominated. Sales totaled about 2800 tons, orders ranging in size from 500 tons for a manufacturer of machinery to carloads, at $10, f.o.b. Birmingham. Schedules against contracts were heavy during the last few days of January, with the result that shipments of the Granite City maker were slightly better than for the preceding month. Implement manufacturers are expected to come into the market for pig iron about Feb. 15. The price situation is unchanged.

Finished Steel

Missouri - Kansas - Texas Railroad bought 2800 tons of 90-lb. rail for Oklahoma lines, dividing the order equally between the Bethlehem Steel Co. and the Tennessee Coal, Iron & Railroad Co. Shipment is to be made this month. A canvass of other lines centering here developed the fact that no plans have been made for rail purchases.

About 1000 tons of 100-lb. rails will be purchased shortly for the municipal bridge and approaches.

Warehouse business shows signs of improvement, although the volume for January was about on a par with December.

Old Material

While no new business of consequence was placed by mills in the district during the week, dealers say that indications are there will be some buying within the next 10 days or two weeks. Railroad lists have been light for some time, and the movement from country dealers has been small because of prevailing low prices. Railroad lists: Pennsylvania, 21,465 tons; Baltimore & Ohio, 2080 tons, and New York Central, 47 carloads. Prices are unchanged.

Canadian Steel Plant Resumes Operations

TORONTO, Feb. 1.—J. H. Kelley, vice-president and general manager, Dominion Steel & Coal Corpn., Sydney, N. S., states that the company has started four open-hearth furnaces after a shutdown of two months. Single shift operations will be maintained for the next two weeks. The orders occasioning the resumption of activities have been received from the subsidiary companies of the corporation, notably the Halifax Shipyards, Pender Nail Works, St. John, and the Eastern Car Works, New Glasgow.

Pig Iron

Sales continue in single car lots. Melters show no indication of changing their buying policy, and state that present conditions in the iron and steel industry do not justify buying for future delivery. Imports are at a standstill. Prices are unchanged.

Old Material

Business stagnation continues in this market. Both Toronto and Montreal dealers state that they are closing very few orders and shipments are in small lots. Dealers are out of the market and price lists are unchanged.

Chicago Steel Market Holding Its Own; Pig Iron Sales and Shipments Gain

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CHICAGO, Feb. 2.—Settlement of the railroad wage question is a major topic of interest in this iron and steel market, which, though holding, seems to have slackened its pace of slow expansion.

Ingot output, subsisting on small and miscellaneous business, is holding near 26 per cent of capacity. However, some expansion is promised next week when a rail mill will be put in operation.

Sales and specifications of finished steel are on a level with recent averages, with the exception that several automobile manufacturers are scaling down specifications. Another factor tending to bear down the market is the inability of farm implement makers to dispose of machines they are now building. It is rather freely predicted that schedules will be materially curtailed near the end of this month.

On the other hand, pig iron shipments continue to creep forward slowly, and the outlook for the new month is for growth in deliveries. Some gain in business is already reported by railroad equipment parts makers; suppliers are anxiously awaiting more activity in railroad shops. It is reported that the Santa Fe is a potential buyer in the car market.

The Middle West has experienced its first real cold spell of the winter. However, it was of short duration and served only to stimulate the movement of heating fuel.

Price structures are in many cases on somewhat of a nominal basis because of the lack of tonnage buying that would afford real tests. Current quotations apply to the general run of small miscellaneous business.

Pig Iron

Sellers are quite satisfied that February shipments of Northern foundry iron will exceed the tonnage moved in January. Orders on hand are larger and releases coming in point to continued slow growth in consumption. Two merchant stacks remain in blast at less than rating, and yet stocks grow. Southern and charcoal iron markets are dull.

Bolts, Nuts and Rivets

Specifications are slowly climbing. Spot orders, though small, are fairly numerous. Railroad equipment parts makers are taking more of these commodities and jobbers are ordering more freely. Farm implement manufacturers are still in this market, but it is probable that their wants will shrink near the end of the month.

Chicago steel business shows no gain, but pig iron orders and shipments are increasing.

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Resumption of idle rail mill next week will aid ingot output.

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Railroad wage settlement expected to stimulate some purchases of repair material.

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Farm implement manufacturers not moving present output, and may curtail schedules March 1.

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Cast Iron Pipe

An award of 2700 tons by Minneapolis and an inquiry for 3000 tons by St. Louis County, Mo., are of outstanding interest in a quiet market. At Milwaukee the low bid on 1200 tons of 12-in. pipe was $25.15 a ton, Birmingham, or $33.95, delivered. On small sales $32 to $33, Birmingham, is fairly representative of the market.

Structural Material

Outstanding because of size and the fact it is private work is the 2000-ton order for a power house near Milwaukee. Award of a post office at Topeka, Kan., also stands out in a market that has varied little in recent months. Bids have been opened on the Mannheim Road viaduct, Illinois, but it is predicted in some quarters that the job will be readvertised. Prices for structural steel at 1.70c. a lb., Chicago, are showing some degree of variation.

Cold-Rolled Strip

Output has not been able to climb above 20 per cent of capacity. Prices lack firmness on attractive tonnages.

Rails and Track Supplies

A few releases are at hand, and one Chicago rail mill will resume operations next week. The rate of output will be small, and additional releases will be needed at an early date to keep this mill in service. The Missouri-Kansas-Texas has divided 2800 tons between Bethlehem and the Tennessee company. There is prospect that the Nickel Plate will soon come into the market for 18,000 tons. The Santa Fe has ordered 6000 tons of tie plates.

Plates

Once again there is tank business in this market, the inquiry being for 1500 tons. Shipments of skelp for large diameter steel pipe manufacture are very light, and a change upward is not in early prospect. Plate makers are eagerly watching for the effects of the railroad wage settlement. A logical outcome of this agreement would be larger use of plates in railroad shops.

Bars

The bar market is steady. The farm implement group is making machinery faster than it is being sold, and it is rather generally thought that, unless conditions improve, present schedules will not be carried beyond March. Orders for rail steel bars are small, but rather frequent. Output of rail steel is at 40 per cent of capacity.

Sheets

Production is close to 25 per cent of capacity. Neither inquiries nor sales indicate an improvement. Most outlets that usually are active at this time of year offer no encouragement. Inland Steel Co. is operating its new mill.

Wire Products

Producers stocks are well rounded, though not of normal size, and production, which closely balances shipments, is being held in the range of 25 to 30 per cent of capacity. Automobile manufacturers are taking slightly smaller quantities. Jobbers show little interest in new tonnages. Prices show instability in some directions.

Reinforcing Bars

Awards of more than 2000 tons indicate an improvement but, as has been the case in recent months, the bulk of the tonnage is for public work. A number of post office projects are taking shape in the Middle West. The trade is still perplexed as to the price structure in the ab-

sence of tests on sizable jobs in and near Chicago.

Old Material

Heavy melting steel is moving more rapidly to consumers. Prices on brokers' trades are firm at $7 against orders at $7.50 a gross ton, delivered.

Cincinnati Pig Iron Orders Gain Slightly

CINCINNATI, Feb. 2.—Average weekly sales of pig iron in January totaled about 1500 tons, compared with 1000 tons a week in December. New business the past week totaled about 2100 tons, of which an Indiana melter took 500 tons and a southern Ohio consumer 600 tons of Northern iron. Recent sales of Northern iron, while still reflecting close competition, indicate a tendency toward firmness of present price schedules. Southern iron continues in light demand, despite present low quotations. Inquiry is negligible.

Warehouse Business

Movement from jobbers' stocks in January was slightly better than in December. Price schedules are unchanged.

Old Material

The scrap market is without feature. Small amounts of No. 2 steel and some blast furnace scrap are moving on contract. Sales are small and generally at "bargain" prices. The Pennsylvania, Baltimore & Ohio and New York Central are offering their usual lists.

New England Sales of Pig Iron Are Small

BOSTON, Feb. 2.—January went down in pig iron history as one of the dullest months ever experienced by most of the furnace representatives in this territory. Sales for the last week in that month amounted only to a few hundred tons. Buffalo district furnaces are securing the major portion of current business despite the fact that Dutch and Indian iron is available for less money.

Old Material

Aside from scattered carlots of No. 1 heavy melting steel for Pittsburgh delivery, for which dealers are paying $4.15 a ton, on cars, shipping point, and a few small lots of heavy cast, virtually no scrap was moved out of New England the past week. New England foundry consumption of machinery cast is at the lowest level in a long time.

Eastern Pennsylvania Mills Operating at Unchanged Rate

Sentiment Better But Business Is Not Improved—Cast Iron Pipe Maker Buys 20,000 Tons of English Pig Iron

PHILADELPHIA, Feb. 2.—The railroad wage reduction has given rise to the hope in the iron and steel trade that the carriers will come into the market for requirements. By some, however, it is doubted if any substantial tonnages will be ordered before the second half. Operations are unchanged, but sentiment has improved somewhat following the railroad labor settlement.

The absence of important buying has left the price situation untested. The softness in the market for strip steel and sheets has not entirely disappeared. Bids opened by the Pennsylvania Railroad for 350 tons of sheets showed 1.60c., Pittsburgh, to be the low figure on No. 10 hot-rolled material.

The pig iron trade has shown interest in a report that 20,000 tons of English iron was sold to a cast iron pipemaker at a low figure, but the actual price has not been disclosed.

Pig Iron

The reported purchase by a Florence, N. J., cast iron pipe manufacturer of 20,000 tons of English iron has caused considerable speculation. The price paid is said to have been under the going level of domestic iron. The actual figure, however, has not been made known. Aside from this sale, only light tonnages are moving.

Plates, Shapes and Bars

Moderate demand is in evidence for merchant steel bars, with small tonnages going at 1.81c. to 1.91c., Philadelphia. The market for common iron bars is dull and unchanged at 2.11c., Philadelphia, but it is reported the figure could be shaded on fair tonnages. Tank plates are quoted generally at 1.60c., Coatesville, for most business, with 1.65c. applying to the smallest lots. Structural shape demand is quiet, with prices unchanged. The railroad wage reduction has had a slightly stimulating effect because of the hope that carriers will come into the market more freely. It is thought generally, however, that immediate buying will be largely for repair work, followed by heavier purchases of rolling stock requirements later in the year.

Sheets

Bids were opened Jan. 26 by the Pennsylvania Railroad on 350 tons of sheets, including No. 10 hot-rolled, No. 24 gage galvanized and No. 24 hot-rolled annealed, with prices quoted f.o.b. Pennsylvania tracks. The low price on No. 10 hot-rolled was 1.60c. for sizes 48 in. and under and 1.70c. for over 48 in. The low on No. 24 hot-rolled annealed sheets was 2.15c. and on No. 24 galvanized it was 2.70c. Several makers quoted these minimum prices. Softness in the market has not entirely disappeared.

Warehouse

Demand is quiet and several lines have reflected declines in prices. These include steel bars, bands, hoops, shapes and pattern plates.

Imports

Last week's imports included 2000 tons of chrome ore from Portuguese Africa and 25 tons of iron strips from Scotland.

Old Material

The market is extremely dull. There are occasional releases by mills for light requirements. Two such movements involved No. 2 heavy melting and machine shop turnings.

Buffalo Pig Iron Sales Slightly Improved

BUFFALO, Feb. 2.—Foundry operation is slightly better. Pig iron sales and shipments are somewhat improved. Unless Buffalo iron is specified, it is difficult for local iron to meet foreign competition in the East. The prevailing Buffalo price in the East seems to be $14.75 to $15, with $14.50 being done occasionally.

Steel

The Lackawanna plant of Bethlehem Steel has increased its open-hearth operation to six units. Republic Steel is not operating here this week. The Seneca Iron & Steel Corpn. is operating at about 30 per cent, and the Buffalo Bolt Co. 25 to 30 per cent. Wickwire Spencer is operating one open-hearth. The Bethlehem rail mill at Lackawanna will go into operation about the middle of February on 4000 tons of rails for the Delaware, Lackawanna & Western Railroad.

Old Material

Small lots of No. 2 heavy melting steel and old compressed sheets are being shipped out of Buffalo. A few sales of No. 1 machiney cast have been made at $9.50 and $9.75.

Cleveland Steel Business Gains; Operations at 38 Per Cent

Though Consumers Are Ordering Sparingly, There Is Greater Diversification of Orders—Rail Inquiry Appears

CLEVELAND, Feb. 2.—Steel orders again gained slightly the past week. January showed a moderate improvement over December. The demand, which early in the month was confined almost wholly to the motor car industry, has become more diversified. However, consumers in all metal-working industries are ordering steel very sparingly.

The increase in local steel plant operation reported last week is being maintained, these plants running this week at 38 per cent of ingot capacity. This is a six point gain over the first week in January.

There was not much activity on the part of the motor car industry in the past few days, although one important producer is making purchases this week of bar mill products.

The Nickel Plate Railroad has come in the market for its 1932 rails, and its requirements will aggregate 17,000 tons. This business is expected to be placed this week and to be equally divided among the Carnegie, Illinois, Bethlehem and Inland companies. Last year the Nickel Plate rail purchases were 27,400 tons. The Erie Railroad has an inquiry out for tie plates to go with the 33,200 tons of rails it recently bought. The steel industry is hoping that the adjustment of railroad wage rates will result in increased steel purchases by the railroads. Activity in the structural field is very low and the building outlook is not promising.

The price situation shows little change, with evidence of firmness lacking. Sheets are still subject to pressure. Further weakness has developed in the auto body grade. Some producers of hot-holled strip have decided to take no more business at the minimum prices that have prevailed recently. Cold-rolled strip has further declined.

Pig Iron

Sales held up fairly well the past week, orders having been fairly numerous. No large lots were placed; the largest purchase was 500 tons. Sales by one producer aggregated 5000 tons. While small foundries are covering for the quarter, larger consumers are limiting their purchases to early needs. Whatever hesitancy there is about buying iron does not appear to be due to doubts about maintenance of present prices, but to whether the iron will be needed. Sales by Cleveland interests during January were from 30 to 50 per cent better than during any one of the two or three previous months. Sentiment is somewhat better in the foundry industry and, while conditions are spotty, there has been a little improvement in melt. Little inquiry is pending. A southern Ohio foundry is in the market for 500 tons. Prices are steady at $15 to $15.50, Cleveland, for foundry and malleable iron for outside shipment and $16, furnace, for local delivery.

Strip Steel

Hot-rolled strip continues in fair demand from makers of lamps and other automotive equipment and from stamping plants. Some effort is being made to stiffen prices, and at least two producers have announced that they have gone back to the 1.45c. and 1.55c. quotations for wide and narrow strip respectively. However, $1 a ton lower prices have not disappeared. Cold-rolled strip is weak, with quotations of 1.85c., Cleveland, a decline of $1 a ton.

Bars, Plates and Shapes

Small orders are slightly more plentiful, resulting in a little increase in the aggregate tonnage booked. Alloy steel bars also show a moderate improvement. New inquiry in the building field continues light. Steel bars generally are holding at 1.55c., Cleveland, although there are reports that this has been shaded. Plates and shapes are unchanged at 1.50c. to 1.60c., Pittsburgh, with most of the business going at the lower price.

Sheets

Demand for small lots was fair in this territory the past week, but the aggregate tonnage was light. Steel barrel and stove manufacturers continue to buy sparingly. Some of the metal furniture manufacturers have become slightly busier. The Fisher Body Corpn. during the week placed a good tonnage in Detroit for its Cleveland plant, which is maintaining recent production of about 2000 bodies a day, but little other business came from the motor car industry. Prices continue weak. Some business in auto body sheets has been taken at 2.85c., and there are reports of a 2.80c. price. While there are reports that 2.15c. is being shaded on hot-rolled annealed sheets, some producers are adhering to 2.25c., which they claim is below their cost of production. For galvanized sheets, 2.80c. has been shaded.

Coke

Ashland and Painesville by-product foundry coke has been reduced 50c. a ton for February shipment. This is now quoted at $8.27, delivered Cleveland.

Old Material

Both Cleveland and Valley mills are taking some scrap, which is resulting in a little activity among dealers. Sales of machine shop turnings are reported at $4.25 to $4.50 for Cleveland delivery. Dealers are paying around $6.25 for borings for shipment to a local mill. For delivery to the Youngstown district, $9.50 is the ruling price for No. 1 heavy melting steel and $8.25 to $8.50 for No. 2. Machine shop turnings have declined 25c. a ton. Other grades are unchanged.

Birmingham Steel Business Shows Improvement; Pig Iron Shipments Also Gain Slightly

BIRMINGHAM, Feb. 2.—The January movement of pig iron was larger than that for December, and furnace yard stocks were reduced during the month. However, there had been a very drastic curtailment in December. Buying is still in small lots to cover current melt. Pipe requirements continue to fluctuate weekly, depending on current bookings. Quotations on district tonnage remain at $11. Only two merchant stacks are active and their production is closely controlled. Since the first of the year six furnaces have been in blast, two being on basic, three on foundry and one on recarburizing iron. The Tennessee company is operating four, Republic Steel one and Sloss-Sheffield one.

Steel

Bookings of one manufacturer last week gave the best weekly total in some months, several orders of more than routine tonnage have been received. Sheet prices have weakened; No. 24 galvanized now ranges from 2.95c. to 3.05c. and No. 10 hot rolled from 1.85c. to 2c. New business of the fabricators has been limited, no order of any size having been secured within recent weeks. Twelve open-hearths were operated last week. The Tennessee company has six active at Ensley and four at Fairfield; Gulf States Steel has two on at Alabama City.

Old Material

Shipments are restricted and there is only occasional buying. The steel mills and larger foundries have their current requirements under contract, but they are taking only a small tonnage. Prices are unchanged.

Eastern Railroad Orders Are Expected for Small Tonnages

Agitation Renewed for Reduction in Rail Price—Tin Plate Imports from Britain Disturb New York Market

NEW YORK, Feb. 2.—Orders from the railroads are expected to come out a little more freely now that the railroad wage reduction has been agreed upon, but such business probably will be confined to minimum requirements for necessary repairs and replacements, at least during the next few months. Rail orders will not be large. For example, the New York Central is understood to be ready to inquire for only 46,000 tons, against a purchase for 1931 of about 170,000 tons. Some of the other Eastern roads will not need rails for some time, as they have tonnages left over from last year which have not yet been laid.

Renewed pressure is being brought to bear by some roads for a reduction in the rail price, their argument being that drastic cuts have been made on all other products, while the rail price has remained unchanged at $43 a gross ton, mill, since 1922. This agitation has been revived from time to time over the past two years. As railroad contracts for steel usually contain a clause protecting the buyer in case of price decline, any reduction would apply on orders that may be placed within the next few weeks. The railroads are said to be holding out for a $3 a ton reduction. If this occurs, readjustments probably will follow on some railroad specialties. Reports that the Lackawanna road would inquire for 16,000 tons of rails, in addition to 4000 tons ordered a week or so ago, are incorrect. An additional order for only 500 tons will be placed shortly. The Interborough Rapid Transit Co. has ordered 9500 tons from Bethlehem Steel Co.

The building situation in New York has been dull for some time, and the immediate outlook is not improved by the notice of employers that they will reduce building trades wages 25 per cent. This reduction, if it is agreed to by the unions, cannot take effect before May 1, and meanwhile building projects probably will be delayed.

Tin plate specifications are not making their usual seasonal gain, one reason being that the mills obtained advance releases late last year, which were immediately rolled, and the large can companies are going slow in estimating their future requirements. The American Can Co. has not yet placed its formal contract, though it has issued some releases in the past month or two. The tin plate price situation is further disturbed by sales of Welsh tin plate for shipment to the Atlantic and Pacific seaboards at $1 to $1.30 per base box under the American official quotations on a delivered basis.

Prices of sheet mill products are still weak. On No. 24 gage hot-rolled annealed sheets 2.15c. a lb., Pittsburgh, has been shaded to barrel makers. On galvanized sheets, 2.75c. has become a common price, with some sales at 2.70c. Merchant bars are holding fairly steady at 1.50c., Pittsburgh, but plates and structural shapes are weak. The plate price for fairly good lots is frequently 1.55c., Coatesville, and even lower has been done in exceptional instances.

Pig Iron

The running volume of business continues to be small. Shipping releases for February are encouraging, however, and, if the recent general increase in foundry melts is sustained, improved demand for iron is in prospect for the early future. Total sales in the past week were 2000 tons, compared with 2500 tons the preceding week and 1500 tons two weeks ago. Two consumers purchased 500 tons each for February-March shipment.

Despite keen foreign competition, domestic furnaces are not pressing sales at concessions to meet this competition. Buffalo and eastern Pennsylvania irons are held firmly at $14.50 to $15, base, furnace. Southern iron, at $10 a ton, Birmingham, is a negligible factor in the Northern market.

Reinforcing Bars

Two State highway bridges in Bergen County, N. J., will require 200 tons of bars; otherwise, demand is practically restricted to car lots. Curtailment in public works projects is becoming more general, with the result that a number of jobs which have been pending for some time are being deferred indefinitely. In the absence of large tonnages, the current price of 1.50c., Pittsburgh, or 1.85c., delivered New York, is untested.

Old Material

A few sales of No. 1 heavy cast and No. 2 cast have established the delivered prices of these grades at $7.50 and $6.50 respectively. All other grades remain quiet.

Pacific Coast Trade Sees Better Sentiment Though Steel Orders Do Not Show Much Gain

SAN FRANCISCO, Feb. 1.—Throughout the trade an improved feeling continues, even though orders actually in hand and pending tonnage do not show much gain. During the past week about 1600 tons of reinforcing bars were placed, and bids were opened on 2850 tons of structural and plate projects, with 1800 tons of new prospective tonnage reported. Within the next month contracts should be placed for more than 18,000 tons of steel for projects already reported and definitely pending on the Pacific Coast.

When the annual conference of steel, iron and kindred industries of California convenes at Santa Barbara Feb. 11, it is expected in many quarters that a closer basis of cooperation between jobbers and mills may be projected, especially in respect to the handling of mill-owned stocks at terminal distributing points. There is a feeling in the industry that recent mill warehouse operation at little or no profit, or at actual loss, may be curtailed with a consequent strengthening of the local market and a more evident spirit of harmony and mutual confidence.

It is reported from Vancouver, B. C., that Monsarrat & Pratley, consulting engineers of Montreal, and W. G. Swan of Vancouver have completed plans for the $5,000,000 Lions' Gate suspension bridge for the First Narrows Bridge Co. Tentative plans provide for a channel width of 1400 ft. and a clearance of 200 ft. above high water.

Signal Hill, Cal., opened bids on 17,572 ft. of 20-in. pipe, with alternate specifications on concrete, cast iron and steel pipe. American Cast Iron Pipe Co. was low on 1320 tons of cast iron pipe and Los Angeles Mfg. Co. was low on steel.

Bids will be opened at Washington on March 2 for the Sacramento, Cal., Post Office, involving 1000 to 1500 tons of structural shapes.

Detroit Scrap Market Is Less Active

DETROIT, Feb. 2.—The local scrap market is less active, although dealers are finding it advisable to cover short orders in anticipation of better prices. With the local steel plant buying only small bargain lots, more material has been moving lately out of Detroit to the Valley and other steel producing centers.

Fabricated Structural Steel

Awards of 13,500 Tons Include 3000 Tons for Post Office Buildings—New Projects of 6000 Tons

BOOKINGS of fabricated structural steel the past week totaled 13,500 tons, compared with 7400 tons in the previous week. Most of the activity was in the Central West, where requirements call for more than 6000 tons. Post office buildings in various sections of the country will take 3000 tons, a power house 2000 tons and a school 1800 tons.

New inquiries of 6000 tons include no sizable jobs. About 1700 tons is for bridge work. Awards follow:

NORTH ATLANTIC STATES

Boston, 1800 tons, State office building, to Lehigh Structural Steel Co.

Somerville, Mass., 100 tons, First National Stores plant addition, to New England Structural Co.

Hartford, Conn., 100 tons, addition to Connecticut Mutual Life Insurance Co. building, to Berlin Construction Co.

New Paltz, N. Y., 125 tons, State practice school, to an unnamed fabricator.

New York, 360 tons, building at 19 East Sixty-fourth Street, to American Bridge Co.

New York, 125 tons, miscellaneous steel forms for Ward's Island, to McClintic-Marshall Corpn.

New York, 190 tons, Grand Central Parkway State highway, Queens, to Lackawanna Steel Construction Co.

New York, 135 tons, Nurses' Home, Welfare Island, to Lieder Iron Works.

Central Islip, N. Y., 200 tons, assembly hall for State hospital, to Bethlehem Fabricators, Inc.

State of Maryland, 250 tons, highway bridge over Patuxenti River, to Pittsburgh-Des Moines Steel Co.

Washington, 400 tons, incinerator plant, to McClintic-Marshall Corpn.

SOUTH AND SOUTHWEST

Leflore County, Okla., 320 tons, highway bridge, to Virginia Bridge & Iron Co.

Memphis, Tenn., 600 tons, steel sheet piling for Government Supply Depot, to Jones & Laughlin Steel Corpn.

Ashland, Ky., 590 tons, Winchester viaduct, to McClintic-Marshall Corpn.

CENTRAL STATES

Cleveland, 250 tons, Goodyear service station, to Burger Iron Co.

State of Ohio, 1040 tons, highway bridges, distributed among several unnamed fabricators; 275 tons to Burger Iron Co., 100 tons to Mount Vernon Bridge Co.

Detroit, 160 tons, factory building, to Whitehead & Kales, Inc.

Milwaukee, 1800 tons, Rufus King High School, to C. Hennecke Co., Milwaukee.

Port Washington, Wis., 2000 tons, power house for Milwaukee Electric Railway & Light Co., to Worden-Allen Co.

Topeka, Kan., 900 tons, post office, to McClintic-Marshall Corpn.

WESTERN STATES

Butte, Mont., 200 tons, post office, to McClintic-Marshall Corpn.

Butte, Mont., 220 tons, highway bridge, to McClintic-Marshall Corpn.

Portland, Ore., 1950 tons, post office, to Poole & McGonigle, Portland.

HAWAIIAN ISLANDS

Hilo, 260 tons, Kress building, to Virginia Bridge & Iron Co., Inc.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Revere, Mass., 112 tons, dancing pavilion.

Fort Lee, N. J., 350 tons, auditorium and gymnasium for Institute of Holy Angels.

Cumberland, Md., 350 tons, post office.

SOUTHWEST

Okmulgee, Okla., 200 tons, post office; Algon & Blair, Montgomery, Ala., general contractors.

Enid, Okla., 250 tons, highway bridge.

CENTRAL STATES

Chicago, 1000 tons, World's Fair building planned by Sears, Roebuck Co.

Chicago, 200 tons, hangar for Goodyear Tire & Rubber Co.

Justice Park, Ill., 4000 tons, viaduct on Mannheim Road; McClintic-Marshall Corpn. low bidder.

Joplin, Mo., 200 tons, highway bridge.

Atcheson, Topeka & Santa Fe Railroad, 450 tons, bridges.

Marseilles, Ill., 1000 tons, dam with eight gates on Illinois River.

WESTERN STATES

Los Alimos, Cal., 140 tons, San Antonio Creek highway bridge; bids close Feb. 17.

Oakland, 175 tons, transit shed extension, Grove Street Pier No. 2; bids close Feb. 8.

Fairbanks, Alaska, 450 tons, post office; bids close Feb. 18.

Geyserville, Cal., 300 tons, Russian River County bridge.

Petaluma, Cal., 100 tons, Petaluma Creek County bridge.

Los Angeles, 500 tons, first unit of Chrysler plant.

Los Angeles, 950 tons, harbor transit sheds, McClintic-Marshall Corpn. low bidder.

Ione, Wash., 500 tons, building projects.

State of Washington, 250 tons, highway bridge in Pend Orielle County.

FABRICATED PLATE

AWARDS

Cambridge, Mass., 160 tons, five oil storage tanks for Lever Brothers Co., to Hodge Boiler Works.

Pittsburgh, 1700 tons, 12 barges for Campbell Transportation Co., to Marietta Mfg. Co.

NEW PROJECTS

Sunnyvale, Cal., 100 tons, tank and tower at naval dirigible dock; McClintic-Marshall Corpn. low bidder.

Sunnyvale, 1000 tons, helium gas holder, Stacey Mfg. Co., low bidder.

Signal Hill, Cal., 800 tons, 17,572 ft. of 20 in. pipe; Los Angeles Mfg. Co. low bidder.

Cast Iron Pipe

Metropolitan District, Hartford County, Conn., awarded 367 tons of 12-in. Class C to R. D. Wood & Co.

Camillus, N. Y., will open bids Feb. 16 on 23,000 ft. of 2 to 10-in.

Newark, N. J., is in the market for 700 tons of 4 to 24-in.

Essex Fells, N. J., opened bids on 100 tons of 10-in.; no award has been made.

United States Navy is inquiring for 300 tons of 10-in.

Minneapolis awarded 2700 tons to American Cast Iron Pipe Co.

Milwaukee opened bids on 1200 tons of 12-in. and 500 tons of 16-in. Class C; United States Pipe & Foundry Co. is low bidder.

Milwaukee awarded 115 tons of Class D and 31 tons of offsets to **Municipal Foundries,** Inc., Milwaukee.

St. Louis County, Mo., will buy 3000 tons of 6 and 12-in.

Signal Hill, Cal., opened bids on 17,572 ft. of 20-in.; American Cast Iron Pipe Co. is low bidder.

Reinforcing Steel

Awards 5125 Tons—New Projects 1800 Tons

Westfield, Mass., 360 tons, State bridge, to Concrete Steel Co.

New York, 200 tons, Grand Central Parkway in Queens, to Joseph T. Ryerson & Son, Inc.; Monroe & Westcott Co., North Attleboro, Mass., general contractor.

Coatesville, Pa., 400 tons, Veterans' Hospital, to Buffalo Steel Co., Tonawanda, N. Y.

Lancaster, Pa., 500 tons, sewage disposal plant, to Edwards Steel Co., Columbia, Pa.

State of Illinois, 600 tons, road work, to an unnamed bidder.

Marseilles, Ill., 130 tons, billet storage building for Wisconsin Steel Co., to Wisconsin Bridge & Iron Co.

Springfield, Mo., 700 tons, Veterans' Hospital, to an unnamed bidder.

Leavenworth, Kan., 900 tons, Veterans' Hospital, to an unnamed bidder.

Los Angeles County, Cal., 323 tons, El Segundo State highway, to Pacific Coast Steel Co.

Orange County, Cal., 292 tons, Laguna Beach State highway, to Pacific Coast Steel Co.

Yountville, Cal., 715 tons, Veterans' Hospital, to Soule Steel Co.

Oakland, Cal., 100 tons, foundation piling for El Dorado Oil Co. plant, to Gunn Carle Co.

NEW REINFORCING BAR PROJECTS

State of New Jersey, 200 tons, two highway bridges in Bergen County.

Norristown, Pa., 300 tons, hospital; bids to be taken Feb. 10.

Danville, Pa., 200 tons, hospital; bids to be taken Feb. 17.

Philadelphia, 200 tons, Girard Library; bids to be taken Feb. 11.

Washington, 235 tons, annex to Library of Congress; general contract to Jacobson Brothers, Chicago.

Washington, 275 tons, barracks, Bolling air field; bids open Feb. 9.

Port Washington, Wis., 200 tons, power plant for Milwaukee Electric Light & Railway Co.

Los Angeles, 150 tons, physics building for University of California.

Pipe Lines

Northern Natural Gas Co., Sioux City, Iowa, has work under way on natural gas pipe line to Sioux Falls, S. D., making connection with present line at Sioux City.

City Council, Emporia, Kan., has plans for natural gas pipe mains and distributing laterals. Cost about $200,000 with operating station. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

Panhandle Eastern Pipe Line Co., an interest of Missouri-Kansas Pipe Line Co., 10 South La Salle Street, Chicago, is considering 20-in. natural gas pipe line from present trunk system to point near Detroit, for service in latter city, about 200 miles. About 35,000 tons of steel pipe will be required. Detroit City Gas Co., Detroit, is interested in project.

Seaboard Air Line Railroad has ordered 2800 tons of tie plates from the Tennessee Coal, Iron & Railroad Co.

▲ ▲ ▲ Prices of Finished and Semi-Finished Steel,

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.81c. to 1.91c.
Del'd New York	1.85c. to 1.95c.
F.o.b. Cleveland	1.55c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Birmingham	1.70c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.50c. to 1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.40c. to 1.50c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.50c. to 1.60c.
Del'd Philadelphia	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
Del'd Cleveland	1.7035c. to 1.8035c.
Del'd Philadelphia	1.6935c. to 1.7435c.
F.o.b. Coatesville	1.60c. to 1.70c.
F.o.b. Sparrows Point	1.60c. to 1.70c.
F.o.b. Lackawanna	1.60c. to 1.70c.
Del'd New York	1.798c. to 1.898c.
C.i.f. Pacific ports	1.80c. to 1.85c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.70c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Bethlehem	1.60c. to 1.70c.
Del'd Cleveland	1.7035c. to 1.8035c.
Del'd Philadelphia	1.5995c. to 1.6495c.
Del'd New York	1.76775c. to 1.86775c.
C.i.f. Pacific ports (standard)	2.05c.
C.i.f. Pacific ports (wide flange)	2.15c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential per 100 Lb.
2000	(½% Nickel)	$0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bar	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold-Finished Bars

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.00c.
Bars, f.o.b. Chicago	2.00c.
Bars, Cleveland	2.00c.
Bars, Buffalo	2.00c.
Shafting, ground, f.o.b. mill	*2.35c. to 3.30c.

*According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.60c. to 1.65c.
No. 10, f.o.b. Chicago mills	1.70c. to 1.75c.
No. 10, del'd Philadelphia	1.91c. to 2.01c.
No. 10, f.o.b. Birmingham	1.75c. to 1.85c.
No. 10, c.i.f. Pacific Coast ports	2.35c.

Hot-Rolled and Annealed

No. 10, Pittsburgh	1.75c. to 1.80c.
No. 10, Chicago mills	1.85c. to 1.90c.
No. 10, Birmingham	1.85c. to 1.95c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.15c. to 2.25c.
No. 24, f.o.b. Chicago mills	2.25c. to 2.35c.
No. 24, del'd Philadelphia	2.46c. to 2.56c.
No. 24, f.o.b. Birmingham	2.45c. to 2.55c.
No. 24, c.i.f. Pacific Coast ports	2.90c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.10c. to 2.20c.
No. 10 gage, f.o.b. Chicago mills	2.25c. to 2.35c.
No. 10 gage, del'd Philadelphia	2.41c. to 2.51c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.65c. to 2.75c.
No. 20 gage, f.o.b. Chicago mills	2.75c. to 2.85c.
No. 20 gage, del'd Philadelphia	2.96c. to 3.06c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	2.80c. to 2.90c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.50c. to 2.55c.
No. 20, f.o.b. Pittsburgh	3.05c. to 3.15c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.75c. to 2.80c.
No. 24, f.o.b. Chicago mills	2.90c.
No. 24, del'd Philadelphia	3.06c. to 3.11c.
No. 24, f.o.b. Birmingham	2.95c.
No. 24, c.i.f. Pacific Coast ports	3.40c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	2.90c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c. to 2.55c.
No. 28, Chicago mill	2.60c. to 2.65c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$4.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. $9.50	25-lb. coating I.C. $14.10
15-lb. coating I.C. 12.00	30-lb. coating I.C. 14.90
20-lb. coating I.C. 13.00	40-lb. coating I.C. 16.70

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh	1.50c. to 1.55c.
Wider than 6 in., P'gh	1.40c. to 1.45c.
6 in. and narrower, Chicago	1.60c. to 1.65c.
Wider than 6 in., Chicago	1.55c. to 1.65c.
Cooperage stock, P'gh	1.60c. to 1.70c.
Cooperage stock, Chicago	1.70c. to 1.80c.

Cold-Rolled Strips

F.o.b. P'gh	1.90c. to 2.00c.
F.o.b. Cleveland	1.85c. to 2.00c.
Del'd Chicago	2.20c. to 2.30c.
F.o.b. Worcester	2.05c. to 2.15c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.85c. to 2.90c.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49½	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½%, and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland) (After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.95
Smooth coated nails	1.95
Galvanized nails	3.90

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.

Woven wire fence, Nos. 9 and 11 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝-in. and larger	$2.60
Spikes, ½-in. and larger	2.60
Spikes, boat and barge	2.80
Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73, 10 and 10
†Carriage bolts	73, 10 and 10
Lag bolts	73, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73, 10 and 10
Hot-pressed nuts, blank or tapped, square	73, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons	73, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73, 10 and 10
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	73, 10 and 10
Semi-finished hexagon castellated nuts, S.A.E.,	73, 10 and 10
Stove bolts in packages, P'gh	85 and 10
Stove bolts in packages, Ch'go	85 and 10
Stove bolts in pkgs., Cleveland	85 and 10
Stove bolts in bulk, P'gh	85, 10 and 2½
Stove bolts in bulk, Ch'go	85, 10 and 2½
Stove bolts in bulk, Cleveland	85, 10 and 2½
Tire bolts	60, 10 and 10

Discounts of 73, 10 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.25
F.o.b. Chicago	2.35

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread,	85, 10 and 10
Upset hex. cap screws, S.A.E. thread	85, 10 and 10
Upset set screws	80, 10 and 5
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$27.00
Rerolling, 4-in. and under 10-in., Youngstown	27.00
Rerolling, 4-in. and under 10-in., Cleveland	27.00
Rerolling, 4-in. and under 10-in., Chicago	29.00
Forging quality, Pittsburgh	34.00
Forging quality, Youngstown	33.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	27.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$27.00
Youngstown	27.00
Cleveland	27.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.50c. to 1.60c.
Universal	1.50c. to 1.60c.
Sheared	1.50c. to 1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.25
Foundry, f.o.b. Connellsville prompt	$3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	8.27
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ¾-in., f.o.b. Pa. mines	$1.70 to $1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.40 to 0.60
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	3.50c.
No. 4 industrial	3.00c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	3.50c.
No. 4 industrial	3.25c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	2.75c.
No. 5 industrial fuel oil	2.60c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	4.75c.
No. 4 distillate	4.00c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-Heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$38.00	$25.00 to $30.00
Maryland	38.00	25.00 to 30.00
New Jersey	$44.00 to 57.00	
Ohio	38.00	25.00 to 30.00
Kentucky	38.00	25.00 to 30.00
Missouri	35.00	30.00
Illinois	38.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

Chrome Brick

	Per Net Ton
Standard size	$42.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$61.50
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$40.40 to $41.40
4-in., del'd Chicago	43.40 to 44.40
6-in. and larger, del'd New York	$30.20
4-in., del'd New York	33.20
6-in. and larger, Birmingham	$32.00 to 33.00
4-in., Birmingham	$35.00 to $36.00

Class "A" and gas pipe, $3 extra.

Pig Iron Prices for All Districts

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	$15.00
Bessemer	$16.00 to 16.50
Gray forge	15.50 to 16.00
No. 2 foundry	15.50 to 16.00
No. 3 foundry	15.00 to 15.50
Malleable	16.00 to 16.50
Low phos., copper free	26.89 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$15.50
No. 2 foundry	$16.50 to 17.00
No. 3 foundry	16.00 to 16.50
Malleable	16.50 to 17.00
Bessemer	16.50 to 17.00

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	$16.50
N'th'n No. 1 fdy.	17.00
Malleable, not over 2.25 sil.	16.50
High phosphorus	16.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
S'th'n No. 2 fdy.	16.14
Low phos., sil. 1 to 2, copper free	$28.50 to 29.20
Silver, sil. 8 per cent	24.92
Bess. ferrosilicon, 14-15%	31.42

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	18.80
Southern No. 2 fdy., del'd	$14.76 to 15.56
Northern malleable, deliv'd	18.80
Northern basic, deliv'd	18.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east. N. J.	$17.91 to $18.41
East. Pa. No. 2 fdy.	17.02 to 17.52
East. Pa. No. 2X fdy.	17.52 to 18.02

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$20.04
*Buffalo, sil. 2.25 to 2.75	20.04
*Ala., sil. 1.75 to 2.25	19.74
*Ala., sil. 2.25 to 2.75	20.24
†Ala., sil. 1.75 to 2.25	15.88
†Ala., sil. 2.25 to 2.75	16.28

Freight rates: $5.04 all rail from Buffalo; $9.75 all rail from Alabama and $5.88 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	18.01
S'th'n Ohio silvery, 8 per cent	22.01

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.81 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$15.64 to $16.14
East. Pa. No. 2X	16.14 to 16.64
East. Pa. No. 1X	16.64 to 17.14
Basic (del'd east. Pa.)	16.25
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east. Pa. furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$16.00
S'th'n fdy., sil. 1.75 to 2.25	16.14
Malleable (local delivery)	16.00
Ohio silvery, 8 per cent	23.12
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Prices of Ores, Ferroalloys and Fluorspar

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, aver. 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	22c. to 23c.
Tungsten, Chinese wolframite	$11.00 to $11.25
Tungsten, domestic scheelite	9.50 to 10.00

	Per Gross Ton
Chrome, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$18.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic seaboard	20.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$72.00 to $75.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*72.00 to 75.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00 to $27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (less carload)	85.00
75%	126.00
14% to 16% (f.o.b. Welland, Ont., in carloads)	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$22.00	13%	$24.50
11%	22.50	14%	26.50
12%	23.50	15%	28.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$19.00	11%	$21.50
7%	19.50	12%	22.50
8%	20.00	13%	23.50
9%	20.50	14%	25.50
10%	21.00	15%	27.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	23.50c. to 25.00c.
Ferrochromium, 0.06% carbon	25.50c. to 27.00c.
Ferrovanadium, del., per lb. contained Va.	$3.05 to $3.30
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	$20.31
No. 2 lump, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	22.31
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.00

Old Material Quotations

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel.	$10.00 to	$10.50
No. 2 heavy melting steel.	9.00 to	9.50
No. 2 railroad wrought..	10.00 to	10.50
Scrap rails	10.00 to	10.50
Rails 3 ft. and under....	12.00 to	12.50
Sheet bar crops, ordinary.	11.00 to	11.50
Compressed sheet steel...	9.50 to	10.00
Hand bundled sheet steel.	9.00 to	9.50
Hvy. steel axle turnings..	9.00 to	9.50
Machine shop turnings....	6.50 to	7.00
Short shov. steel turnings.	6.50 to	7.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
Cast iron carwheels	10.50 to	11.00
Heavy breakable cast....	8.00 to	8.50
No. 1 cast	9.50 to	10.50
Railr. knuckles and couplers	10.50 to	11.50
Rail. coil and leaf springs	10.50 to	11.50
Rolled steel wheels	10.50 to	11.50
Low phos. billet crops...	13.00 to	13.50
Low phos. sheet bar crops	12.50 to	13.00
Low phos. plate scrap....	10.50 to	11.50
Low phos. punchings.....	10.50 to	11.50
Steel car axles	15.00 to	15.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel	$7.00 to	$7.50
Shoveling steel	7.00 to	7.50
Frogs, switches and guards	7.00 to	7.50
Hydraulic comp. sheets...	5.50 to	6.00
Drop forge flashings.....	5.00 to	5.50
No. 1 busheling	5.00 to	5.50
Rolled carwheels	8.00 to	8.50
Railroad tires	9.00 to	9.50
Railroad leaf springs.....	8.50 to	9.00
Axle turnings	5.75 to	6.25
Steel couplers and knuckles	8.25 to	8.75
Coil springs	9.50 to	10.00
Axle turnings (elec. fur.).	6.00 to	6.50
Low phos. punchings....	10.00 to	10.50
Low phos. plates, 12 in. and under	9.00 to	9.50
Cast iron borings	3.50 to	4.00
Short shoveling turnings..	4.00 to	4.50
Machine shop turnings....	4.00 to	4.50
Rerolling rails	10.50 to	11.00
Steel rails, less than 3 ft..	9.25 to	9.75
Steel rails, less than 2 ft..	10.00 to	10.50
Angle bars, steel	8.25 to	8.75
Cast iron carwheels	7.50 to	8.00
Railroad malleable	7.00 to	7.50
Agricultural malleable....	7.00 to	7.50
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relay. rails, 65 lb. and up	22.00 to	27.00

Per Net Ton

Iron angle and splice bars	7.00 to	7.50
Iron arch bars, transoms..	7.00 to	7.50
Iron car axles	13.00 to	14.00
Steel car axles	10.25 to	10.75
No. 1 railroad wrought...	5.50 to	6.00
No. 2 railroad wrought...	6.25 to	6.75
No. 1 busheling	4.75 to	5.25
No. 2 busheling	2.50 to	3.00
Locomotive tires, smooth..	8.00 to	9.00
Pipes and flues	3.25 to	3.75
No. 1 machinery cast....	7.50 to	8.00
Clean automobile cast....	7.25 to	7.75
No. 1 railroad cast	6.00 to	6.50
No. 1 agricultural cast....	6.25 to	6.75
Stove plate	5.75 to	6.25
Grate bars	5.50 to	6.00
Brake shoes	5.75 to	6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel.	$7.00 to	$8.00
No. 2 heavy melting steel.	5.50 to	6.50
No. 1 railroad wrought...	8.50 to	9.00
Bundled sheets		6.00
Hydraulic compressed, new	6.50 to	7.00
Hydraulic compressed, old.	6.00 to	6.50
Machine shop turnings....	4.00 to	4.50
Heavy axle turnings.....	6.00 to	6.50
Cast borings (nom.).....		3.50
Heavy breakable cast....		9.00
Stove plate (steel works).		7.00
No. 1 low phos. hvy.....	10.00 to	11.00
Couplers and knuckles....	8.50 to	9.00
Rolled steel wheels.....	8.50 to	9.00
No. 1 blast furnace.....		3.50
Spec. iron and steel pipe..		10.50
Shafting	13.50 to	14.00
Steel axles	14.50 to	15.00
No. 1 forge fire		6.00
Cast iron carwheels.....	10.00 to	10.50
No. 1 cast	10.00 to	10.50
Cast borings (chem.).....	11.50 to	12.00
Steel rails for rolling.....		10.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel..	$7.50 to	$8.00
No. 2 heavy melting steel..	6.75 to	7.25
Compressed sheet steel...	7.00 to	7.25
Light bundled sheet stampings	6.00 to	6.50
Drop forge flashings.....	6.00 to	6.25
Machine-shop turnings....	4.50 to	4.75
Short shoveling turnings..	5.75 to	6.25
No. 1 busheling	6.50 to	6.75
Steel axle turnings.....	7.50 to	8.00
Low phos., billet crops....	14.00 to	14.50
Cast iron borings.....	5.75 to	6.25
Mixed borings and short turnings	5.75 to	6.25
No. 2 busheling	5.75 to	6.00
No. 1 cast	9.00 to	9.50
Railroad grate bars.....	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft.	15.00 to	15.50
Rails for rolling	13.00 to	13.50
Railroad malleable.....	11.00 to	11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel..		$8.00
No. 2 heavy melting scrap.		6.50
Scrap rails	$8.00 to	8.50
New hydraul. comp. sheets		6.50
Old hydraul. comp. sheets.		5.50
Drop forge flashings.....		6.50
No. 1 busheling	6.50 to	7.00
Hvy. steel axle turnings...	7.00 to	7.50
Machine shop turnings....		5.00
Knuckles and couplers....		10.00
Coil and leaf springs.....		10.00
Rolled steel wheels.....		10.00
Low phos. billet crops....	12.00 to	12.50
Short shov. steel turnings..	7.00 to	7.50
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings.....	6.00 to	6.50
No. 2 busheling	3.50 to	4.00
Steel car axles	10.00 to	11.00
Iron axles	12.00 to	12.50
No. 1 machinery cast.....	9.50 to	10.00
Stove plate	8.25 to	8.75
Steel rails, 3 ft. and under	11.50 to	12.00
Cast iron carwheels	9.00 to	9.50
Industrial malleable.....	9.00 to	9.50
Railroad malleable.....	9.00 to	9.50
Chemical borings	8.50 to	9.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel.....	$7.50 to	$8.00
Scrap steel rails.....	8.00 to	8.50
Short shoveling turnings..	3.50 to	4.00
Stove plates		6.00
Steel axles		12.00
Iron axles		12.00
No. 1 railroad wrought....		6.00
Rails for rolling	9.00 to	9.50
No. 1 cast		9.00
Tramcar wheels	9.00 to	10.00
Cast iron borings, chem...	10.00 to	11.00

ST. LOUIS

Dealers' buying prices per gross ton:

Selected heavy steel.....	$7.00 to	$7.50
No. 1 heavy melting	6.25 to	6.75
No. 2 heavy melting.....	6.00 to	6.50
No. 1 locomotive tires	7.50 to	8.00
Misc. stand-sec. rails.....	7.50 to	7.75
Railroad springs	8.50 to	9.00
Bundled sheets	4.25 to	4.75
No. 2 railroad wrought...	6.25 to	6.75
No. 1 busheling	5.75 to	6.25
Cast iron borings and shoveling turnings.....	4.75 to	5.25
Iron rails	7.00 to	8.00
Rails for rolling	9.25 to	9.75
Machine shop turnings....	3.00 to	3.50
Heavy turnings.....	5.50 to	6.00
Steel car axles	9.50 to	10.00
Iron car axles	14.00 to	14.50
Wrot. iron bars and trans.	5.00 to	5.50
No. 1 railroad wrought....	4.75 to	5.25
Steel rails, less than 3 ft..	10.00 to	10.50
Steel angle bars	6.50 to	7.00
Cast iron carwheels.....	6.50 to	7.00
No. 1 machinery cast.....	8.00 to	8.50
Railroad malleable	5.00 to	5.50
No. 1 railroad cast.....	6.25 to	6.75
Stove plate	6.00 to	6.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	5.00 to	5.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel..	$4.25 to	$5.50
No. 2 heavy melting steel.	3.75 to	4.50
Heavy melting steel (yard)	2.75 to	3.00
No. 1 hvy. breakable cast..	5.00 to	5.50
Stove plate (steel works)..	3.00 to	3.50
Machine shop turnings....	1.00 to	1.50
Short shoveling turnings..	1.00 to	1.50
Cast borings	1.00 to	1.50
No. 1 blast furnace.....	1.00 to	1.50
Steel car axles	10.00 to	10.50
Iron car axles (nom.)....	14.00 to	14.50
Spec. iron and steel pipe...		5.00
Forge fire		3.25
No. 1 railroad wrought...	5.00 to	5.25
No. 1 yard wrought, long..	4.00 to	4.25
Rails for rolling.....	6.00 to	6.25
Stove plate (foundry)....	4.75 to	5.25
Malleable cast (railroad)..	6.00 to	6.50
Cast borings (chemical)..	8.00 to	8.50

Per gross ton, delivered local foundries:

No. 1 machinery cast..	$8.50
No. 1 hvy. cast (cupola size).....	7.50
No. 2 cast	6.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel..	$4.00 to	$4.25
Scrap T rails	3.80 to	4.60
Machine shop turnings....		1.05
Cast iron borings.....		1.05
Bundled skeleton, long....		2.50
Forge flashings	3.00 to	3.50
Blast furnace scrap.....		1.05
Forge scrap.....	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	6.00 to	6.50
Cast iron borings, chemical	7.00 to	7.25

Per gross ton delivered consumers' yards:

Textile cast	$8.75 to	$9.25
No. 1 machinery cast.....	8.75 to	9.25
Stove plate	5.00 to	5.25
Railroad malleable	10.50 to	11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel.....	$6.00 to	$7.00
Scrap rails for melting....	8.00 to	8.50
Loose sheet clippings.....	2.25 to	2.75
Bundled sheets	4.75 to	5.25
Cast iron borings	2.75 to	3.25
Machine shop turnings...	3.25 to	3.75
No. 1 busheling.....	4.25 to	4.75
No. 2 busheling.....	2.50 to	3.00
Rails for rolling	9.00 to	9.50
No. 1 locomotive tires....	8.50 to	9.00
Short rails	11.75 to	12.25
Cast iron carwheels.....	8.25 to	8.75
No. 1 machinery cast....	10.00 to	10.50
No. 1 railroad cast.....	8.75 to	9.25
Burnt cast	4.25 to	4.75
Stove plate	4.25 to	4.75
Agricultural malleable....	8.00 to	8.50
Railroad malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting	$5.75 to	$6.25
Borings and short turnings	4.00 to	4.50
Long turnings	3.25 to	3.75
No. 1 machinery cast.....	8.50 to	9.00
Automotive cast	10.75 to	11.25
Hydraul. comp. sheets....	5.75 to	6.25
Stove plate	4.50 to	5.00
New No. 1 busheling.....	4.75 to	5.25
Old No. 2 busheling.....	3.00 to	3.50
Sheet clippings.....	3.25 to	3.75
Flashings	4.75 to	5.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel.....	$7.00	$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings..	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings	2.00	2.00
Steel borings.....	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast....	12.50	10.00
Stove plate	10.00	8.00
Standard carwheels.....	11.00	8.50
Malleable	10.00	8.00

Warehouse Prices for Iron and Steel Products

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.75c.
Rail steel reinforcement—	
For buildings	1.55c.
Road slabs, bridges, culverts	1.40c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.10c.
Flats and squares	3.60c.
Bands, 7/8 in. (in. Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (7/8 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural	3.75c.
Rivets, boiler	3.75c.
	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Coach and lag screws	73
Hot-pressed nuts, sq., tap. or blank	73
Hot-pressed nuts, hex., tap. or blank	73
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex	3.10c.
Cold-fin. flats and sq.	3.60c.
Hoops and bands, No. 12 to 7/8 in., inclusive	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb.	$2.75
No. 9 galv. wire, per 100 lb.	3.20
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.50
4-in.	36.00
Lap-welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.45
Black wire, base per 100 lb.	3.20

NEW YORK

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.60c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel, 1/2 x 1/2 in. and larger	3.40c.
Smooth finish, 1 to 2 1/2 x 1/4 in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.60
	Per Cent Off List
Machine bolts, cut thread:	
3/4 x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
1/2 x 6 in. and smaller	65 to 65 and 10
3/4 x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	73
Carriage bolts	73
Lag screws	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	73
Less than 200 lb.	63

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, 1/4-in. and heavier	2.80c.	3.00c.	2.50c.
Soft steel bars	2.80c.	3.00c.	2.50c.
Reinforcing bars	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c.	4.00c.	4.00c.
Hot-rolled sheets (No. 10)	3.40c.	3.50c.	3.50c.
Galv. sheets (No. 24)	4.40c.	4.20c.	4.50c.
Struc. rivets, 1/2 in. and larger, less than 1000 lb.	5.00c.	5.00c.	5.50c.
Cold-finished steel bars and shafting:			
Rounds	5.25c.	5.00c.	4.25c.
Square and hexagon	6.25c.	6.50c.	5.50c.
Flats	6.75c.	6.50c.	6.50c.
Common wire nails, base per keg in less carloads	$2.75	$2.75	$2.75

Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to group differentials.

Cold-finished steel bars and shafting, subject to warehouse differentials for quantity.

PITTSBURGH

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.10c.
Squares and flats	3.60c.
Bands	2.95c.
Hoops	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count,	70 and 10 per cent off list
Machine bolts, 100 count,	70 and 10 per cent off list
Carriage bolts, 100 count,	70 and 10 per cent off list
Nuts, all styles, 100 count,	73 and 10 per cent off list
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb.	2.75
Common wire nails, per keg	2.25
Cement coated nails, per keg	2.25

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

PHILADELPHIA

	Base per Lb.
Plates, 1/4-in. and heavier	2.45c.
Structural shapes	2.45c.
Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform	2.30c.
Cold-fin. steel, rounds and hex	3.30c.
Cold-fin. steel, sq. and flats	3.80c.
Steel hoops	3.00c.
Steel bands, No. 12 to 7/8-in., inclu.	2.75c.
Spring steel	5.00c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled and annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, 1/4 in.	5.00c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

BOSTON

	Base per Lb.
Plates	*3.35c.
Structural shapes	*3.35c.
Soft steel bars, small shapes	*3.25c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Spring steel, open-hearth	5.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75c. to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Rivets, structural or boiler	4.80c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Copper Price Is Reduced; Tin Steady; Antimony Active; Zinc Weak

NEW YORK, Feb. 2.—Primary producers officially reduced the price today of electrolytic copper to 6.75c. a lb., delivered Connecticut Valley. The reduction was apparently influenced by selling pressure on the part of customs smelters and small mine producers, who have been offering electrolytic copper during the past week at prices below the previous official quotation. Buyers have so far failed to respond to the lower quotations, however, and are evidently awaiting assurance against further declines before considering new purchases. The new price is for spot metal, but in view of the dearth of business it would undoubtedly apply also to futures.

Copper Exporters, Inc., lowered its quotation today to 6.87½c. a lb., delivered, c.i.f. usual European ports. This reduction followed export sales at 7.12½c. on Jan. 30. Export sales in January aggregated only 16,500 tons, compared with 25,500 tons in December. Lake copper has been reduced to 6.87½c., delivered, but little business has resulted.

Copper Averages

The average price of Lake copper, based on daily quotations in THE IRON AGE, is 7.55c. a lb., delivered New York, for January. The average price of electrolytic copper is 7.12½c., refinery, or 7.37½c., delivered in the Connecticut Valley.

Lead

Moderate buying continues from day to day. Books have been opened for March orders, but practically no business has been placed for delivery in that month. The price is held firmly at 3.75c., New York, and 3.55c., St. Louis. European sales of lead today were in better volume than in some months.

Tin

After a quiet week, demand experienced a spurt yesterday, when sales of about 350 tons were made for first quarter delivery, principally to consumers. The market continues to be steady, with today's quotation 22.25c. Today's London market is £140 17s. 6d. a ton for spot standard, £143 10s. for future standard and £143 15s. for spot Straits. The Singapore quotation today is £145 5s. The world's visible supply of tin now stands at 49,570 tons, a decrease of 1368 tons from December. American tin deliveries in January totaled 3550 tons. Straits shipments to the United States last month were 1600 tons, and the tonnage of all tin en route to the United States is 3076 tons. Estimated shipments of Straits tin for February are 7000 tons, and estimated production of Straits tin in the current month is 4000 tons. United Kingdom warehouse stocks are at 37,453 tons, an increase of 172 tons over the week before.

Zinc

A new low price level has been reached at 2.85c., East St. Louis, and 3.22c., New York, for February-March delivery. Sales in the past week totaled about 3000 tons, chiefly to consumers.

Antimony

Both price and demand have reacted sharply to the Sino-Japanese crisis. With inventories generally at a low point, consumers have covered for a substantial part of their early needs. Speculative buying has also stimulated demand. About 200 tons was sold today, mostly at 7.25c. a lb., duty paid, New York.

Wrought Iron Co., Will Continue Operations

The Wrought Iron Co. of America has stated at its offices in Philadelphia that it will continue to operate its plant at Lebanon, Pa., despite the petition of a minority stockholder for a receiver. The company will file a demurrer asking the court to set aside the application for a receivership. The applicant was John D. Brown, former superintendent of the plant.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 27	Jan. 28	Jan. 29	Jan. 30	Feb. 1	Feb. 2
Lake copper, New York	7.62½	7.62½	7.62½	7.62½	6.87½	6.87½
Electrolytic copper, N. Y.*	7.12½	7.12½	7.12½	7.12½	7.12½	6.50
Straits tin, spot, N. Y.	21.85	21.65	21.70	....	22.10	22.25
Zinc, East St. Louis	2.90	2.90	2.90	2.90	2.85	2.85
Zinc, New York	3.27	3.27	3.27	3.27	3.22	3.22
Lead, St. Louis	3.55	3.55	3.55	3.55	3.55	3.55
Lead, New York	3.75	3.75	3.75	3.75	3.75	3.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 7.25c. a lb., New York.
Brass ingots, 85-5-5-5, 6.87½c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	24.00c. to 25.00c.
Tin, bar	26.00c. to 28.00c.
Copper, Lake	8.75c. to 9.75c.
Copper, electrolytic	8.50c. to 9.50c.
Copper, casting	8.25c. to 9.25c.
*Copper sheets, hot-rolled	15.87½c.
*High brass sheets	12.87½c.
*Seamless brass tubes	16.12½c.
*Seamless copper tubes	15.37½c.
*Brass rods	10.62½c.
*Brazed brass tubes	22.00c.
Zinc, slab	4.75c. to 5.25c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.50c. to 5.00c.
Lead, bar	6.25c. to 7.25c.
Lead sheets	8.00c.
Antimony, Asiatic	9.00c. to 10.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.	17.00c. to 18.00c.
Solder, ½ and ½	15.25c. to 16.25c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	26.50c.
Tin, bar	28.50c.
Copper, Lake	8.62½c.
Copper, electrolytic	8.62½c.
Copper, casting	8.25c.
Zinc, slab	4.75c. to 5.00c.
Lead, American pig	4.30c. to 4.50c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	29.50c.
Solder, ½ and ½	18.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.50c.	6.25c.
Copper, hvy. and wire	5.25c.	6.00c.
Copper, light and bottoms	4.25c.	5.00c.
Brass, heavy	2.75c.	3.50c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.25c.	5.00c.
No. 1 yel. brass turnings	3.25c.	3.75c.
No. 1 red brass or compos. turnings	3.75c.	4.50c.
Lead, heavy	2.75c.	3.125c.
Zinc	1.25c.	1.75c.
Cast aluminum	3.25c.	5.00c.
Sheet aluminum	8.50c.	10.50c.

PLANT EXPANSION AND EQUIPMENT BUYING

Ford Buys About 30 Milling Machines

Automotive Orders the Brightest Spot in Dull Machine Tool Trade—Inquiries Gain

ALTHOUGH details of machine tool purchases by the Ford Motor Co. are carefully guarded, it is known that several machine tool builders have received fairly large orders. About 30 milling machines, a number of grinding machines and some lathes have been bought, in addition to a good-sized lot of multiple spindle drilling machines, mentioned a week ago. The new equipment is required for the new eight-cylinder Ford model, which probably will make its appearance on the market in April. Other automobile companies have bought some equipment, but in much smaller lots than Ford. The Nash Motors Co., Kenosha, Wis., is expected to come into the market soon for new production equipment.

Aside from automotive purchases, machine tool business did not show much, if any, improvement in January. The immediate outlook is not especially promising, although inquiries have improved.

United States Government bureaus are taking bids on a number of machines. One inquiry calls for bids this week on a varied list of equipment.

The Equitable Meter Co., Pittsburgh, has undertaken a modernization program. A few machines have been purchased, and some others will soon be ordered. The Pittsburgh Board of Education is about to inquire for a list of tools for manual training departments in high schools.

The General Electric Co. is stepping up production of electric refrigerators at its Schenectady works to 10,000 a week.

New York

Machine tool business in this district did not improve materially in January. Some dealers did less business than in December, while with others December was the poorest month of the depression period. One of the busiest hives of manufacturing activity in the East is the electric refrigerator department of the General Electric Co. at Schenectady. Production is being stepped up to 10,000 units a week.

Pittsburgh

Machine tool purchases during January were no larger than in December, according to the majority of dealers, but greater improvement in the number and variety of new inquiries is reported. Concerns which have delayed the purchase of new equipment for as much as a year are showing more inclination to go ahead with plans, and sentiment among dealers is considerably better.

The Equitable Meter Co., Pittsburgh, is undertaking a modernization and improvement program calling for the purchase of a number of tools. Three lathes have been placed and prospective awards include a gear cutter, drilling machines and other equipment. The Navy Department, Washington, will take bids Feb. 2 on a milling machine for use at Munhall, Pa. The Pittsburgh Board of Education is also preparing to inquire for a number of tools for manual training shops in high schools. The Pennsylvania Railroad has not yet announced plans for rebuilding its Twelfth Street shops at Altoona, Pa., recently destroyed by fire.

Cincinnati

A few orders for single light tools comprised the past week's business. One leading manufacturer of lathes has closed his plant for 10 days to permit orders to accumulate. Inquiries continue in good volume.

New England

Interest among machine tool and allied companies the past week centered in the Government inquiry for equipment, bids for which close Feb. 3. Quotations were asked on drop hammers, drills, grinding machines, lathes, planers, milling machines, presses, punches, riveters, a rolling machine, power saws and miscellaneous equipment, also leather belting and pumps and parts. No sales of importance were reported, and new inquiries are few.

Chicago

January closed with sales no higher than in December and with billings smaller for the reason that most builders hurried work out near the end of the year. Inquiries have improved slightly and reflect desire rather than actual ability to buy.

Cleveland

Machine tool orders continue to be light, although there has been a slight improvement in spots. Turret lathes are moving a little better. Recent purchases by the Ford Motor Co. for its new eight-cylinder motor apparently were on quite a large scale. Two Cleveland dealers shared in this business. Two companies are understood to have sold a total of 34 milling machines, taking used tools in exchange. The Army Air Corps, Wright Field, Dayton, has opened bids for two 20-in. x 6-ft. motor-driven toolroom lathes.

Milwaukee

Perceptible improvement in machine tool orders from automotive industries has occurred. It is understood that the Nash Motors Co., Kenosha, Wis., has practically completed extensive retooling in its various plants and is a likely prospect for production equipment by the middle of March. General industrial activity is expanding slowly.

◀ NEW YORK ▶

Pan-American Petroleum & Transport Co., 122 East Forty-second Street, New York, contemplates oil refinery near Houston, Tex., including pumping plant, power house, bulk storage and distributing unit, and other structures. Cost over 2,000,000 with equipment. Company is a subsidiary of Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago.

Scandore Paper Box Co., 169 Franklin Avenue, Brooklyn, manufacturer of corrugated and other paper boxes and containers, purchased seven-story factory of Westinghouse Lamp Co., at 31-43 Steuben Street, 100 x 160 ft., for new plant.

Signal Supply Officer, Army Base, Brooklyn, asks bids until Feb. 23 for quantity of aluminum alloy frames and battery mountings, as parts for telephones, (Circular 80) and 13,250 terminals (Circular 79); until Feb. 8 for quantity of plugs (Circular 75); until Feb. 19 for 15,000 ft. cable (Circular 77), and quantity of coils and capacitors (Circular 78).

Erickson Specialty Co., Inc., New York, has been organized by Frederic W. Erickson, 8 Serpentine Trail, Larchmont, N. Y., and

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Edward Erickson, 305 Valley Road, Montclair, N. J., to manufacture tools, machinery and parts.

Frank Wolk, 319 Johnson Avenue, Brooklyn, meat products, let general contract to O. Joroff, 336 East Ninety-fifth Street, New York, for two-story and basement meat-packing plant. Cost over $25,000 with equipment. Stadler Engineering Co., 410 Liberty Street, New York, engineer.

Consolidated Gas Co. of New York, 4 Irving Place, has arranged bond issues of $75,000,000, divided into three groups, each $25,000,000, for New York Edison Co., Brooklyn Edison Co., and United Electric Light & Power Co., fund to be used in part for general operations and expansions.

Bureau of Supplies and Accounts, Navy Department, Washington, and Naval Supply Depot, Brooklyn, asks bids until Feb. 9 for 105,500 lb. medium hull plate steel (Schedule 7344) and 22,400 lb. sheet steel (Schedule 7343) for Brooklyn Navy Yard.

W. Hurwitz & Sons, 92-25 160th Street, Jamaica, L. I., hardware products, have plans for three-story storage and distributing plant. Cost about $45,000 with equipment. Jack Fein, 1773 Pitkin Avenue, Brooklyn, architect.

Delaware, Lackawanna & Western Railroad Co., 90 West Street, New York, C. C. Hubbell, purchasing agent, asks bids until Feb. 8 for tie plates, spikes, angle bars, rail, etc. (Serial Contract 207).

Hardscrabble Water District, Pleasantville, N. Y., has plans for two-story pumping plant. Cost over $25,000 with machinery. Charles A. Dewey, Pleasantville, architect.

New York Rapid Transit Co., 385 Flatbush Avenue, Brooklyn, operating Brooklyn-Manhattan Transit Lines, plans installation of train tripping equipment, signal devices and auxiliary train control equipment on Sea Beach Line, Coney Island Avenue. Cost close to $350,000; also, similar equipment for part of Lexington Avenue line. Cost about like sum.

Ruden & Aaraas, Inc., Brooklyn, has been organized by A. Frank Ruden and A. J. Aarsas to take over and expand company of same name at 217 Thirty-seventh Street, manufacture of machinery and parts, millwright specialties, etc.

Board of Education, Carlstadt, N. J., has authorized installation of manual training equipment in two-story and basement junior high and elementary school. Cost over $250,000. George F. Beal, 241 Bell Avenue, Hasbrouck Heights, N. J., architect.

Tung-Sol Lamp Works, Inc., 95 Eighth Avenue, Newark, N. J., manufacturer of radio tubes and equipment, leased one-story building at 26-28 Clay Street, totaling 18,000 sq. ft. floor space, for storage and distributing addition.

Commanding Officer, Picatinny Arsenal, near Dover, N. J., asks bids until Feb. 9 for 23,500 arming wire swivel loops (Circular 231).

Royal Battery Corpn., New Brunswick, N. J., care of R. E. and A. D. Watson, Bayard Street, attorneys, has been organized by Alfred Foster, Larchmont, N. Y., and William Dudde, Rye, N. Y., capital $125,000, to manufacture storage batteries and parts.

Star Electric Motor Co., 140 Miller Street, Newark, manufacturer of electric motors and parts, has leased plant at Bloomfield Avenue and Grove Street, Bloomfield, N. J., for new and larger plant. Star company recently had plans drawn for new factory in Newark, which will be held in abeyance.

Board of Education, Lodi, N. J., will soon take bids on general contract for two-story and basement junior and senior high school, and plans manual training department. Cost about $350,000. Frank Pirrone, 104 Midland Avenue, Garfield, N. J., architect.

NEW ENGLAND

General Electric Co., Schenectady, N. Y., has plans for a two-story factory branch, distributing and service building, 100 x 125 ft., at Springfield, Mass. Cost about $150,000 with equipment. Work will be carried out under direction of General Electric Realty Corpn., Schenectady, an affiliated organization.

School Board, Lee, Mass., plans installation of manual training department in two-story and basement high school; bids to be asked on general contract in about 30 days. Cost $175,000. Revised plans are being drawn by M. W. Maloney, 23 Pearl Street, Springfield, Mass., architect.

Connecticut Electric Service Co., Hartford, Conn., subsidiary of United Gas Improvement Co., Philadelphia, has acquired Central Connecticut Light & Power Co., East Hampton, Conn. Purchasing company plans expansion and improvements, including transmission lines.

West Dudley Paper Co., West Dudley, Mass., plans rebuilding portion of mill, including turbine department, recently destroyed by fire with loss of $35,000 including equipment.

Engineering Service, Inc., New Britain, Conn., has been organized by Julius Feinberg, 77 Brooklawn Street, New Britain, and A. H. French, 97 Walden Street, West Hartford, Conn., to manufacture oil-burning equipment and devices.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 9 for two motor-driven toolmakers' precision lathes (Schedule 7368), and 60,000 lb. ingot aluminum-alloy (Schedule 7375) for Portsmouth, N. H., Navy Yard.

Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, Conn., architect and engineer, has plans for two-story automobile service, repair and garage building, 50 x 100 ft., at Greenwich, Conn.

International Silver Co., Meriden, Conn., contemplates one-story addition, 40 x 300 ft. Cost over $65,000 with equipment.

Walter L. Parker Bobbin & Spool Co., Lowell, Mass., has been organized, capital $250,000, to take over and expand Walter L. Parker Co., manufacturer of shuttles, bobbins and other textile machinery. John M. Fairbanks, president; and H. Hutchins Parker, treasurer.

Industrial Managers, Inc., Bridgeport, Conn., has acquired plant and assets of Connecticut Electric Mfg. Co., Bridgeport, manufacturer of electrical equipment, in receivership for about a year, for $175,000. Purchasing company is considering operation of property.

American Knife Co., 25 Boyd Street, Winsted, Conn., contemplates moving to new quarters soon, and is considering equipment installations.

PHILADELPHIA

E. I. du Pont de Nemours & Co., Thirty-fifth Street and Grays Ferry Avenue, Philadelphia, Paint and Varnish Division, let general contract to Austin Co., for five-story addition, 75 x 160 ft., for manufacture of special paint products. Cost about $500,000 with equipment.

Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until Feb. 8 for one turbine-type blower (Req. 5111), quantity of naval-rolled sheet brass (Aero Req. 1127), condensers, jacks, relays, resistors, dials, etc. (Aero Req. 935), aluminum alloy tubing (Aero Req. 1119), 100 pitotstatic aircraft tubes (Aero Req. 447-32).

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Joseph H. Hagedorn, director, asks bids until Feb. 8 for quantity of copperoid pipe, wire, cable, etc.

Borough Council, Swarthmore, Pa., has asked bids on general contract for one-story municipal repair and service building, including equipment storage and distributing unit.

Good Roads Machinery Corpn., Kennett Square, Pa., has been organized to take over and expand Good Roads Machinery Co., manufacturer of road-building, grading and kindred machinery. Carl W. Funk, 3127 Queen Lane, Philadelphia, and Geoffrey S. Smith, Fort Washington, Pa., heads.

National Casket Co., 2041-43 Arch Street, Philadelphia, has plans for four-story and basement factory branch, storage and distributing plant, 45 x 155 ft., on recently acquired site on Fairmont Avenue. Cost over $85,000 with equipment. Gustavus A. Young, McCarthy Building, Syracuse, N. Y., architect. Company headquarters are at 60 Massachusetts Avenue, Boston.

Bureau of Supplies and Accounts, Navy Department, Washington, and Supply Officer, Navy Yard, Philadelphia, ask bids until Feb. 9 for pilot and bellows equipment, speed indicators and distance recorders, and spare parts (Schedule 7361); until Feb. 16 for 10 aircraft supercharger pressure gages (Schedule 7356), 500 aircraft altimeters (Schedule 7354), 200 aircraft inclinometers (Schedule 7353), 200 aircraft turn and bank indicators (Schedule 7357); until Feb. 23 for 75 hand fuel pumps (Schedule 7358) for Philadelphia Navy Yard.

Young's Rubber Corpn. of New Jersey, Enterprise Avenue, Trenton, N. J., manufacturer of rubber specialties, plans rebuilding portion of plant recently destroyed by fire. Loss over $75,000 including equipment.

Burnwell Corpn., Allentown, Pa., has been organized by Walter G. Lentz, 1113 North Twentieth Street, and associates, to manufacture oil-burning apparatus and allied equipment. Thomas B. Kern, 740 Main Street, Bethlehem, Pa., is interested in company.

Bridgeville Packing Association, Bridgeville, Del., plans rebuilding food product packing plant recently destroyed by fire. Loss about $75,000 with equipment.

Bethlehem Steel Corpn. will advance production schedule at Harlan car-building plant, Wilmington, Del., following contract from Reading Co. for 30 all-steel passenger coaches for electrified lines.

York Ice Machinery Corpn., York, Pa., is increasing plant operations. Company has secured orders for ice-manufacturing equipment totaling $400,000.

BUFFALO

Medina Iron & Brass Co., Medina, N. Y., manufacturer of soil pipe and fittings, recently reorganized, plans expansion with facilities for production of other iron and brass products. Company has become identified with Somerville Iron Works, Somerville, N. J.; William J. Kirby, one of heads of last noted company, is president and chairman of board of Medina organization.

Board of Village Trustees, Camillus, N. Y., asks bids until Feb. 11 for motor-driven pumping machinery and auxiliary equipment in connection with new sewage system. Allen & Homes, 604 Sedgwick, Andrews and Kennedy Building, Syracuse, N. Y., engineers.

City Council, Lockport, N. Y., is considering municipal hydroelectric power plant, using water from local barge canal, to have initial capacity of 5000 hp. Charles E. Dickinson, president, Niagara Falls Milling Co., Market Street, is active in project.

Morrison Metalweld Process, Inc., Buffalo, has been organized by Raymond L. Morrison, 54 Fordham Drive, and associates, to manufacture iron, steel, copper, bronze and other metal products.

Contracting Officer, Quartermaster Corps, Fort Niagara, N. Y., asks bids until Feb. 9 for quantity of galvanized steel pipe, malleable iron fittings, couplings, gate valves, washers, valve boxes, etc. (Circular 12).

Elmira Water, Light & Railroad Co., Elmira, N. Y., has applied for permission to construct a gas distributing system, with pressure station, etc., at Catherine, N. Y., and vicinity.

SOUTH ATLANTIC

Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until Feb. 9 for quantity of toggle bolts, conduit clamps, pipe straps, 30,000 ft. solid wire, switches, etc. (Circular 63).

Maryland Culvert & Metal Co., Munsey Building, Baltimore, plans one-story addition to plant on South Ridgely Street, 25 x 40 ft. for manufacture of corrugated metal culverts, metal pipe and kindred products.

P. & H. Morton Advertising Co., 222 South Howard Street, Baltimore, manufacturer of signs, displays, etc., has acquired for expansion plant of General Outdoor Advertising Co., 3001 Remington Avenue, manufacturer of similar products. General Outdoor Company will take over sign and display plants and business of Morton company at Washington, Alexandria, Va.; Annapolis, Frederick and Cumberland, Md., and will expand operations.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for cross-compound, steam-driven air compressor, capacity 5000 cu. ft. free air a min., for Norfolk Navy Yard (Specification 6769); until Feb. 10 for sheet steel dust enclosure for coal bunkers at navy yard, Washington (Specification 6754); until Feb. 24 for magazine and other buildings, conveyor housings, conveyors, piping and mechanical equipment for navel mine depot, Yorktown, Va. (Specification 6548).

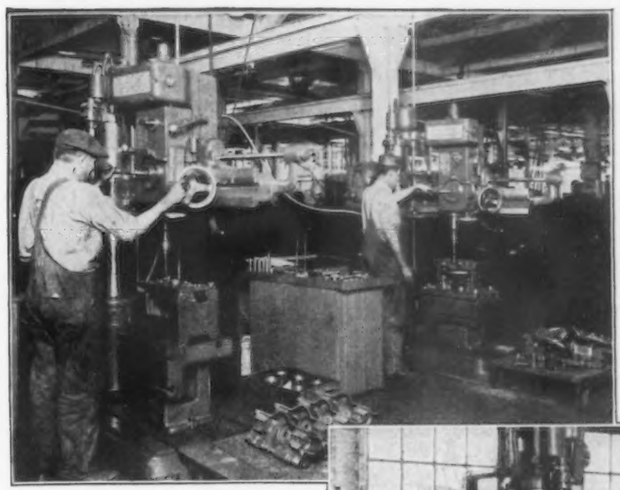
Airport Committee, Chamber of Commerce, Durham, N. C., is at head of project to erect municipal airport on 40-acre tract on Roxboro Road, including hangar, repair shop and other field units. H. W. Kueffner is city engineer.

Georgia Veneer & Package Co., Brunswick, Ga., has approved plans for one-story addition, 60 x 120 ft., and will increase capacity about 50 per cent.

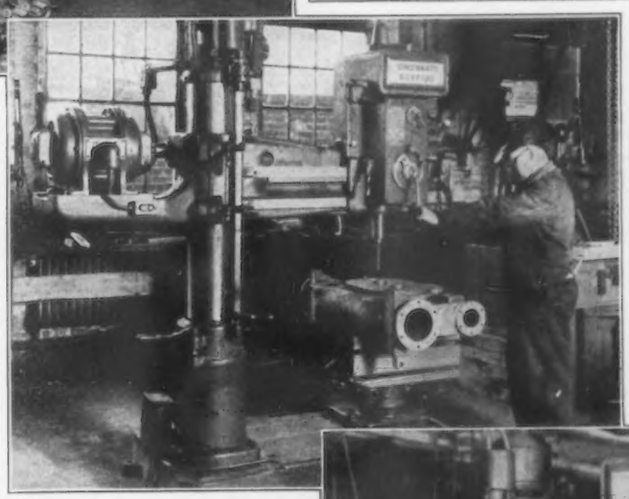
Western Tablet & Stationery Corpn., 700 Everett Street, Richmond, Va., with headquarters at Dayton, Ohio, let general contract to Allen J. Saville Co., Electric Building, for one-story addition, 120 x 125 ft., to factory branch, storage and distributing plant. Cost over $30,000 with equipment.

Division of Purchases, Sales and Traffic, Department of Agriculture, Washington, asks bids until Feb. 9 for one hand operated batch mixer (Circular 939) for Washington; one magnetic grain separator for Beltsville, Md. (Circular 933); until Feb. 12 for one gas-fired boiler for Wescalo, Tex. (Circular 916).

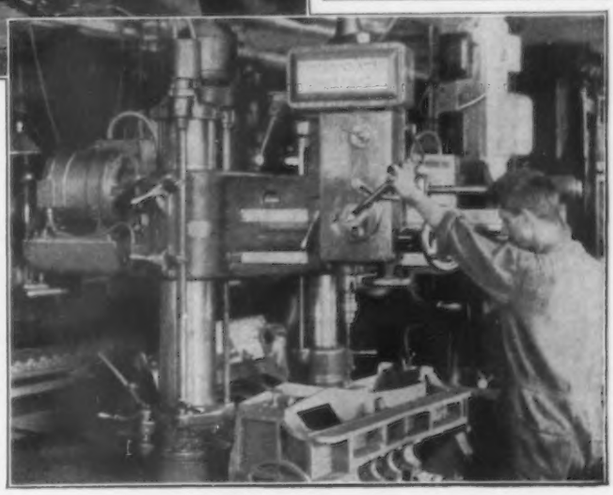
These Users Save Drilling Time With Cincinnati Bickford 2-A Radials



Among the first of the new 2-A Radials installed are these two in the plant of the Heald Machine Company of Worcester, Mass. Accuracy and speed were the prime requisites. With the installation of these two machines, the Heald Machine Company now has a battery of twelve Cincinnati Bickford Radials.



The Waterous Company of St. Paul, Minnesota, manufacturers of fire engines and fire fighting equipment, is making remarkable savings with this new 2-A Radial which handles a variety of work that was formerly handled on large upright drills.



In the production line of The Autocar Company, this 2-A Radial Drill is saving 22% of former drilling time. Thirty-five operations—drilling, tapping and reaming, are performed on the cast iron crank case.

The Cincinnati Bickford 2-A Radial has a 3 foot arm, 9 in. column and 12 speed head. Spindle speeds from 71 to 1500 r.p.m. are instantly obtained. Constant speed, direct connected driving motor is employed. Other features are explained in Catalog R-17. Write for it today.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY, CINCINNATI, OHIO

B. L. Churchill, Southern Pines, N. C., plans purchase of wood-turning machines and other equipment for manufacture of handles for hammers, axes, etc.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 9 for one hardness-testing machine (Schedule 7359) for Annapolis Navy Yard; motor-driven centrifugal pump (Schedule 7347) three transformers (Schedule 7348), quantity armored electric cable (Schedule 7346), for Parris Island, S. C., Navy Yard; two motor-driven tool and cutter grinders (Schedule 7366) for Newport Navy Yard; 17,400 ft. plow steel wire rope and quantity phosphor bronze wire rope (Schedule 7367) for Norfolk Navy Yard; until Feb. 16 for insulated wire and cable (Schedule 7336) for Eastern and Western yards; two main engine circulating water pumps and spare parts (Schedule 7330) for Portsmouth and Brooklyn yards; 16 combined condensite fresh water circulating pumps and spare parts (Schedule 7345) for Brooklyn, Philadelphia, Mare Island and Puget Sound yards.

South Carolina Power Co., Charleston, S. C., is arranging operating fund of $1,298,000, portion to be used for expansion and improvements in power plants and systems, distributing lines and power substations.

General Supply Committee, Washington, asks bids until Feb. 19 for force and suction pumps, crowbars, axes, chisel bars, bits, saw blades, ratchet braces, pipe cutters, threading dies, drills and extra drill points, automobile and screw jacks, hatchets, gages, saw frames and other tools and equipment (Classes 11 and 41).

◀ PITTSBURGH ▶

United States Engineer Office, Pittsburgh, asks bids until Feb. 24 for three lock buildings at new lock No. 4, Monongahela River (Circular 494). Bids will soon be asked for construction of steel hull dipper dredge, with dipper capacity of 2½ cu. yd.

Hazel-Atlas Glass Co., Wheeling, W. Va., has closed tank department at Atlas plant, and will carry out improvements including rebuilding of tanks, replacement of equipment, etc. Company has completed rebuilding three of four tank units at Hazel plant, Washington, Pa., and will place in service soon.

Vigilant Mfg. Co., Sharon, Pa., has been organized by Darrell S. Kepler, 389 High Avenue, and Emrys G. Francis, 58 East State Street, to manufacture metal products and mechanical equipment.

United States Engineer Office, Huntington, W. Va., asks bids until Feb. 9 for one steam-driven air compressor (Circular 150), and two air receivers (Circular 151). Plans are under way for construction of a 15-ton steel hull whirler derrick boat.

Board of Trustees, South Side Hospital, 1800 Carson Street, Pittsburgh, has plans for power house and service building in connection with expansion program. Entire project will cost over $1,500,000. Press C. Dowler, Century Building, is architect; S. S. Goldwater, 1212 Fifth Avenue, New York, consulting architect.

American Car & Foundry Co., Berwick, Pa., has started up production schedule for construction of 500 steel cars for New York subway system. Work for about 1500 men has been arranged.

◀ CLEVELAND ▶

Peerless Motor Car Corpn., Quincy and East Ninety-third Streets, Cleveland, is considering expansion, primarily for development and production of new metal products to occupy portion of plant. Manufacture of automobiles will be continued.

Master Body Co., Cleveland, has been organized by Max M. Myers, 708 Guarantee Title Building, and Bert A. Gerson to manufacture automobile bodies.

City Council, Sandusky, Ohio, in cooperation with Great Lakes Harbors Association, Milwaukee, R. F. Mailin, secretary, is considering appointment of Port Commission for harbor improvements, including combined water and land terminal, belt railroad and airport with hangars, repair shop, and other structures. Cost about $350,000. MacElwee & Crandall are port and harbor engineers.

Frank Boyle, recently appointed receiver for Warren Tool & Forge Co., Warren, Ohio, will reopen plant at once, following shut down for three months, establishing five-day week schedule with force of 400 men.

Board of Works, Cleveland, plans installation of pumping machinery, tanks and other equipment, conveying machinery, etc., in sewage disposal plant in Southerly district. Cost close to $2,000,000. George B. Gascoigne, Leader Building, is consulting engineer.

Goodyear Tire & Rubber Co., Akron, Ohio, has adopted full six-day week schedule, replacing five-day week basis.

◀ ST. LOUIS ▶

Kroger Grocery & Baking Co., 35 East Seventh Street, Cincinnati, plans two-story and basement storage and distributing plant at Oklahoma City, Okla. Cost about $100,000 with equipment. W. H. Fryer, 810 N. W. Fourth Street, local manager.

Kansas Power & Light Co., Topeka, Kan., has arranged bond issue of $7,500,000, portion of proceeds to be used for expansion and improvements in power plants and system.

Contracting Officer, Quartermaster Department, Fort Riley, Kan., asks bids until Feb. 8 for gas pressure regulators, valves, gaskets, hot water storage tanks, gas and refrigeration supplies, heaters, gas soldering furnace and other equipment (Circular 49).

Bryant Self-Adjusting Brakes, Inc., Little Rock, Ark., has been organized by T. J. Morris, 126 Louisiana Street, and associates to manufacture automobile and other brakes, parts, etc.

Western Machinery Co., 105 West Third Street, Wichita, Kan., let general contract to Walter Ramsey, 808 Litchfield Street, for one story storage and distributing plant.

International Paper Co., Camden, Ark., is running on 24-hr. day schedule at kraft paper mill, divided into four six-hour shifts. Company has closed similar mill at Bastrop, La., concentrating production at Camden.

City Council, Deepwater, Mo., plans installation of pumping machinery and auxiliary power equipment in connection with municipal water system. Cost about $40,000. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., engineers.

Continental Oil Co., Ponca City, Okla., plans extensions and improvements in oil refining plant, including coke-screening and conveying equipment, ammonia tanks, etc.

Oklahoma Gas & Electric Co., Oklahoma City, Okla., will soon begin work on expansion and improvement program, including new transmission lines at Durant, El Reno and other points, power substations, underground and overhead transmission lines at Oklahoma City and vicinity, and distributing lines. Cost over $100,000 with equipment.

Kanotex Refining Co., Arkansas City, Kan., plans rebuilding of oil refining plant recently damaged by fire.

◀ CHICAGO ▶

Champion Radio Mfg. Co., Chicago, has leased 4000 sq. ft. of space in building at 400-12 West Erie Street, for new plant.

Iowa Soda Products Co., Twenty-ninth Street and First Avenue, Council Bluffs, Iowa, has plans for rebuilding portion of plant recently destroyed by fire, work to begin in spring. Cost about $150,000 with machinery. Lewis F. Salisbury, manager.

United States Engineer Office, Duluth, Minn., asks bids until Feb. 10 for one steel spud for dredge (Circular 36); until Feb. 16 for one gasoline motor launch (Circular 35).

Mitchell Oil Co., Macomb, Ill., plans bulk oil storage and distributing plant at Oskaloosa, Iowa. Cost close to $35,000 with equipment.

Central Broadcasting Co., Des Moines and Davenport, Iowa, operating radio station WOC and WHO, plans new broadcasting station between Marengo and Grinnell, Iowa, with steel towers, power house and other equipment. Cost about $125,000.

Super-Compressed Air Motors Corpn., 19 South La Salle Street, Chicago, has been organized by P. Maniscaloo and Albert H. Fry, address noted, to manufacture air compressor equipment and parts.

Illinois Bell Telephone Co., 212 West Washington Street, Chicago, has authorized fund of $535,395 for new construction and improvements in metropolitan district, including buildings, station equipment, line extensions, etc. For similar work in other parts of State, appropriation of $558,614 has been approved.

A. & B. Machine Works, Chicago, has leased 3000 sq. ft. of space in building at 440-52 West Huron Street, for machine and repair works.

Phillips Petroleum Co., Bartlesville, Okla., has plans for new bulk oil storage and distributing plant at Davenport, Iowa, with tanks, pumping equipment, etc. Cost about $45,000 with equipment.

Bitter Root Packing Co., Hamilton, Mont., recently organized by F. T. Parker and Wallace McCrackin, Hamilton, plans fruit packing plant, with ice and refrigerating section, and storage and distributing unit. Cost over $150,000 with equipment. Work will begin in spring.

G. & L. Machine & Tool Works, Chicago, has been organized by C. Samuels and associates to take over and expand company of same name at 1926 South Wabash Avenue, manufacturer of tools and machinery, and parts.

State Board of Charities and Corrections, State House, Pierre, S. D., plans early call for bids for coal-handling equipment for power house at institution at Yankton, S. D. Walter J. Dixon, Woefel Building, Mitchell, S. D., is architect and engineer.

Lincoln Mfg. Co., 201 North Wells Street, Chicago, recently incorporated with capital of $1,000,000 by Marshall P. Fox and O. G. King, has no connection with Lincoln Mfg. Co., 3430 South Ashland Avenue, Chicago, as stated in THE IRON AGE of Jan. 28, according to information from William G. Pokorny, 111 West Washington Street, Chicago, attorney for latter company.

◀ CINCINNATI ▶

Cincinnati Union Terminal Co., Temple Bar Building, Cincinnati, let general contract to James Stewart, Inc., Clark and Dalton Streets, for two-story and basement mail handling and distributing building, 172 x 185 ft. Cost about $600,000 with conveying, elevating, loading and other equipment. H. M. Waite, address noted, is chief engineer.

Contracting Officer, Wright Field, Dayton, Ohio, asks bids until Feb. 10 for quantity of exhaust heater assemblies, exhaust heater braces, exhaust heater clamps, tube ends, drive elbows, etc. (Circular 274); until Feb. 15 for 33-gal. and 10-gal. capacity galvanized iron corrugated cans; until Feb. 23 for 12 bodies and equipment for heavy-duty field servicing trucks (Circular 278).

J. A. Switzer, Knoxville, Tenn., consulting engineer, is head of project to build waterworks at Sevierville, Tenn., including pumping and auxiliary machinery, storage tanks, etc. Cost over $60,000.

Nashville Gas & Heating Co., Nashville, Tenn., an interest of United Gas Improvement Co., Philadelphia, plans expansion and improvements in gas plants and systems. Cost over $300,000 with equipment.

Quartermaster, United States Army, Camp Knox, Ky., asks bids until Feb. 15 for 60,000 sq. ft. galvanized wire screen cloth (Circular 22).

Kentucky Utilities Co., Louisville, has disposed of bond issue of $2,000,000, portion of proceeds to be used for expansion and improvements in plants and system.

Frigidaire Corpn., Dayton, Ohio, manufacturer of electric refrigerators, a unit of General Motors Corpn., has perfected new unit type of air-conditioning equipment for commercial establishments, shops, offices, etc., and will use portion of plant for new line of output.

United States Engineer Office, Memphis, Tenn., will soon take bids for steel floating drydock.

◀ INDIANA ▶

State Highway Commission, State House, Indianapolis, plans early call for bids for gasoline pumps, tanks, oil and grease pumps, tank wagons and auxiliary equipment.

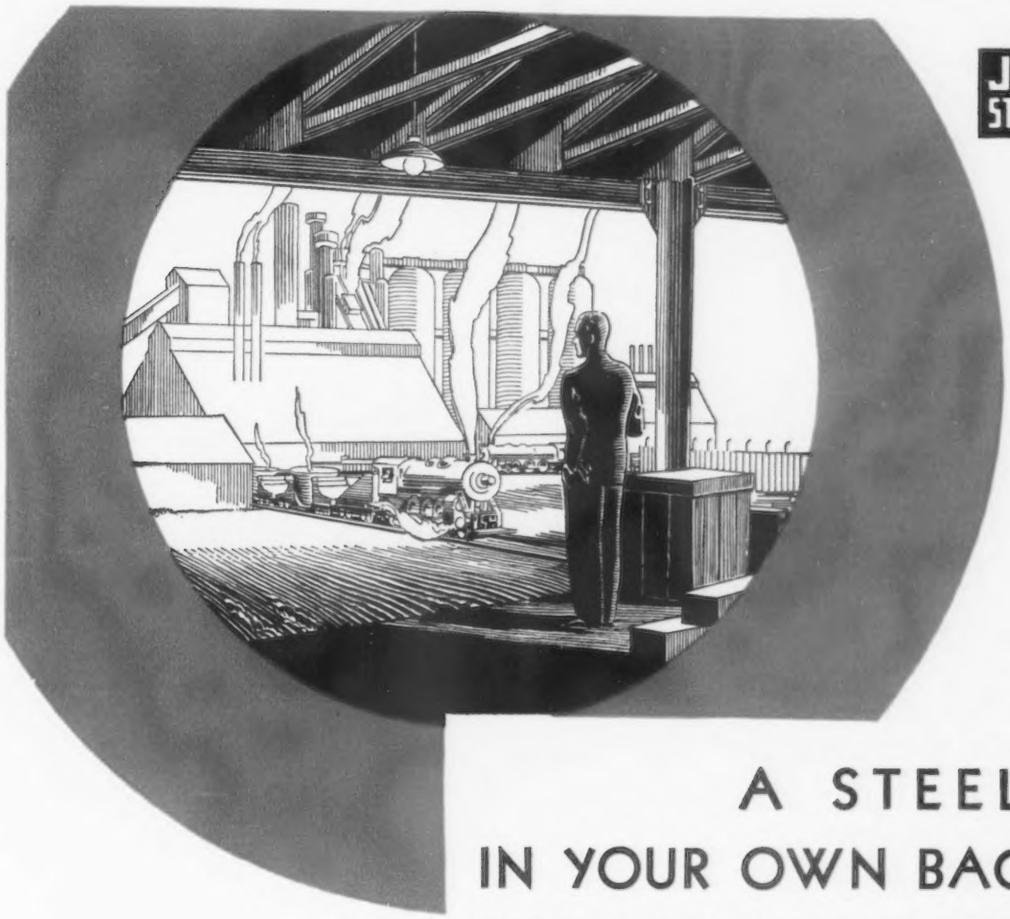
Lehman Co. of America, Inc., Cannelton, manufacturer of juvenile furniture, has acquired building at Jackson, Miss., for branch plant. Edgar Lehman will be in charge.

Board of Public Works, East Chicago, plans installation of pumping machinery, power and other equipment in connection with new sewage disposal plant and system. Cost close to $1,000,000. Consoer, Older & Quinlan, Inc., 205 West Wacker Drive, Chicago, is consulting engineer.

Board of Trustees, Indiana State Reformatory, Pendleton, will begin erection of trade school in connection with three-story institutional building, 80 x 160 ft. Cost over $125,000 with equipment.

Standard Grain Co., Lapel, contemplates erection of new grain elevator, with conveying, screening and other equipment. Work to begin in spring. Cost over $40,000 with equipment.

Magnavox Co., 155 East Ohio Street, Chicago, manufacturer of radio equipment, will remove executive division and other departments to factory at Fort Wayne, where production and engineering will be concentrated with all other operating divisions.



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AND BE SURE . .

DETROIT

Chrysler Corpn., 341 Massachusetts Avenue, Detroit, plans early call for bids for assembling plant on 30-acre tract at Los Angeles, recently acquired. Works will include a body-building and finishing unit, and chassis division for Chrysler cars; truck body and chassis manufacturing unit, with assembling plant adjoining for light and heavy duty trucks and school buses of Dodge Brothers, and two-story administration building. Cost about $2,000,000 with equipment.

Kelly-Robbins Mfg. Co., Inc., Owosso, Mich., has been organized by George R. Robbins and John O. Kelly, 530 North Dewey Street, to manufacture portable power units for hand stocks, pipe dies, etc.

Howard Flint Ink Co., 2545 Scotten Avenue, Detroit, manufacturer of printing inks, plans one-story branch plant at New Orleans, totaling 15,000 sq. ft. floor space. Cost $50,000 with equipment. W. C. Ray, engineer, in charge.

Reliance Elevator Co., St. Joseph, Mich., will develop increased production schedule. Company has secured contract for 308 passenger and freight elevators for two 15-story pier buildings to be built by International Terminals Corpn., Boston, totaling $3,000,000.

Board of Public Works, Kalamazoo, Mich., plans installation of pumping machinery and other power equipment in connection with extensions and improvements in municipal waterworks. Cost about $300,000, work will begin in spring. E. C. Rutz, city engineer.

Thornton Tandem Co., 2341 Wolcott Avenue, Ferndale, Mich., has been organized by Ray Thornton, 1776 York Boulevard, Dearborn, Mich., and Richard F. Barnum, Detroit, to manufacture tools and machinery.

Campbell, Wyant & Cannon Foundry Co., Muskegon Heights, Mich., is giving employment to more than 100 men on a 24-hr. day basis. Large part of production is given over to cast iron brake drums for automobiles.

GULF STATES

Shell Petroleum Corpn., Houston, Tex., plans extensions and improvements in oil refining plant on Houston Ship Channel, Deer Park, about 20 miles from city, with installation of new gasoline refining equipment, stills and accessory equipment. Cost about $250,000 with machinery. Headquarters in Shell Building, St. Louis.

Cilty Commission, Miami, Fla., has secured over 600 acres of land for airport and dirigible base and will soon begin construction of hangar, with repair shop and other field units. Department of Aviation, A. H. Heermance, director, in charge.

Superintendent of Lighthouses, Key West, Fla., asks bids until March 7 for metal work for one iron tower.

Board of Education, San Antonio, Tex., asks bids on general contract until Feb. 24 for new vocational school at Main Avenue and Roman Street, including remodeling present school unit on adjoining site for vocational service, and acetylene gas generator building. Harvey P. Smith, National Bank of Commerce Building, is architect; W. E. Simpson & Co., Milam Building, mechanical engineers.

Standard Oil Co., Baton Rouge, La., plans rebuilding portion of oil refining plant, including cold distilling unit, recently destroyed by fire. Loss over $90,000 with equipment.

Magnolia Petroleum Co., Dallas, Tex., has acquired properties of Owenwood Oil Corpn., Fort Worth, Tex., in receivership, including storage and distributing plant. Purchasing company will operate and plans extensions and improvements.

Gulf Refining Co., Gulf Building, Houston, Tex., is considering gasoline refining plant near Overton, Tex. Cost close to $90,000. It is proposed to remove present plant from Seminole, Tex., to location noted and increase capacity.

Board of Education, Dallas, Tex., has authorized purchase of site in East Dallos for multi-story, J. L. Long Junior High School, and will instal many training departments. Cost over $250,000. Herbert M. Greene, LaRoche & Dahl, Dallas, architects.

Bostex Oil Corpn., 1202 Alamo National Bank Building, San Antonio, Tex., recently organized, plans installation of equipment for oil-drilling, storage and distributing operations. Charles M. Boston, Swank Building, Johnstown, Pa., president.

MILWAUKEE

Filer & Stowell Co., 147 East Becher Street, Milwaukee, manufacturer of steam engines, air compressors, sawmill, conveying and transmission machinery, has placed general contract with Klug & Smith Co., 111 East Wisconsin Avenue, for addition, 63 x 168 ft., to main foundry. Ground was broken Feb. 1. James L. Monaghan is president and general manager.

Kiel Saw Mill Manufactory, Kiel, Wis., has been established by Michael Weber to manufacture line of tractor-power portable sawmills. Principal model employs 9-gage, 44-in. saw with inserted teeth.

Nash Motors Co., Kenosha, Wis., and subsidiary, Seaman Body Corpn., Milwaukee, recalled large number of employees Feb. 1 to start production of five new series of passenger car models scheduled for formal announcement March 1. Prospects are considered favorable for retention of crew or even additions after dealers' samples have been manufactured.

Northern Corrugating Co., Green Bay, Wis., is making some additions to equipment for manufacture of new lines, including steel seating for auditoriums, folding armchairs, etc. Volume of business in 1931 is reported 20 per cent above 1930, with 36,000 more working hours provided than in any other year.

Board of Education, Medford, Wis., closes bids Feb. 10 for addition to and alterations in high school, designed by G. A. Krasin, local architect. Cost about $75,000. L. D. Russell is secretary.

CANADA

Pittsburgh Water Heater Co., Pittsburgh, will take over part of former Secord plant at Brantford, Ont., for assembly of hot water heaters. Later other lines of company may be added.

Beauchemin & Fils, Sorel, Que., controlled by Consolidated Marine Companies, Ltd., has been reorganized as Sorel Steel Foundries, Ltd. New company also forms part of Consolidated Marine Co., group. Equipment will be modernized and new lines of manufacture will be added. P. H. Desrosiers, formerly managing director of Joliette Steel, Ltd., is general manager of new company.

A. A. Pepper, 801 Millwood Road and E. Malone, 792 Millwood Road, Toronto, are interested in a company which will erect a plant at Leaside, Ont., for manufacture of concrete blocks, etc.

Hamilton Clamp & Stamping Works, 62 Ashley Street, Hamilton, Ont., has awarded contract to Inglis & Son, for one-story addition, 35 x 50 ft.

New Brunswick Electric Power Commission, St. John, N. B., plans to enlarge its generating plant at Newcastle Landing, N. B., and to install extra turbo-generator units.

Champlain Lumber Co., Ltd., Levis, Que., is asking for prices on a used Diesel engine, 30 to 50 hp.

PACIFIC COAST

United States Foundry Co., 6623 Stanford Avenue, Los Angeles, has filed plans for one-story foundry addition, 39 x 169 ft. Allen R. Pease, 942 West Sixty-fourth Street, architect.

Claremont High School District, Claremont, Cal., plans one-story addition to vocational shop in connection with extensions in high school. Bond issue of $148,000 has been authorized. Marsh, Smith & Powell, Architects' Building, Los Angeles, architects.

Libby, McNeil & Libby, Ryde, Cal., plan rebuilding portion of local food product canning plant, recently destroyed by fire. Loss over $300,000 with equipment. Headquarters at Union Stock Yards, Chicago.

Department of Public Works, Division of Highways, San Luis Obispo, Cal., has plans for repair and maintenance buildings near Salinas, Monterey County, including forge and blacksmith shop, pumping plant, elevated water tank and tower, truck building, oil and gasoline storage and distributing unit, and other buildings.

Curtis Automatic Sprinkler Co., Los Angeles, has been organized by George G. Curtis and George M. Crawford to take over and expand company of same name at 6627 McKinley Avenue, manufacturer of sprinklers and sprinker systems.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 9 for quantity of double center universal couplings (Schedule 7372); until Feb. 16 for 128,800 lb. flat steel (Schedule 7380) for Mare Island Navy Yard; two corrugated suspension furnaces for San Francisco or Seattle yards (Schedule 7373); metal shelving and furniture (Schedule 7371) for San Diego Navy Yard.

Gas-Ice Corpn. of Washington, Northern Life Tower, Seattle, R. B. Newbern, president, will begin excavations for new dry ice-manufacturing plant at Klickitat Springs, near Goldendale, Wash., to use natural gas as fuel. Cost close to $100,000 with machinery. Company plans to drill additional gas wells and carry out expansion in future. Stevens & Koon, Spalding Building, Portland, consulting engineers.

Bureau of Reclamation, Denver, let general contract to General Construction Co., 3840 Iowa Street, Seattle, for power plant and power canal at Prosser, Wash., in connection with reclamation project in that district.

Board of Public Works, Kittitas, Wash., plans installation of turbine pumping unit, 250 gal. a min. capacity, and other pumping machinery, with elevated steel tank and tower, 100 ft. high, capacity 100,000 gal., in connection with extensions and improvements in waterworks. Bonds for $30,000 are being arranged. J. R. Bannon is city engineer.

Bureau of Public Roads, State House, Portland, has asked bids on general contract for three one-story units for equipment storage and distributing plant, with repair and reconditioning department, at Vancouver, Wash. Cost over $175,000 with equipment.

FOREIGN

Elwerath Gewedkschaft, Hamburg, Germany, has work under way on new oil refining plant with capacity for handling about 2600 bbl. of crude oil a day. Cost about $1,000,000 with machinery. Arthur G. McKee & Co., 2422 Euclid Avenue, Cleveland, engineers.

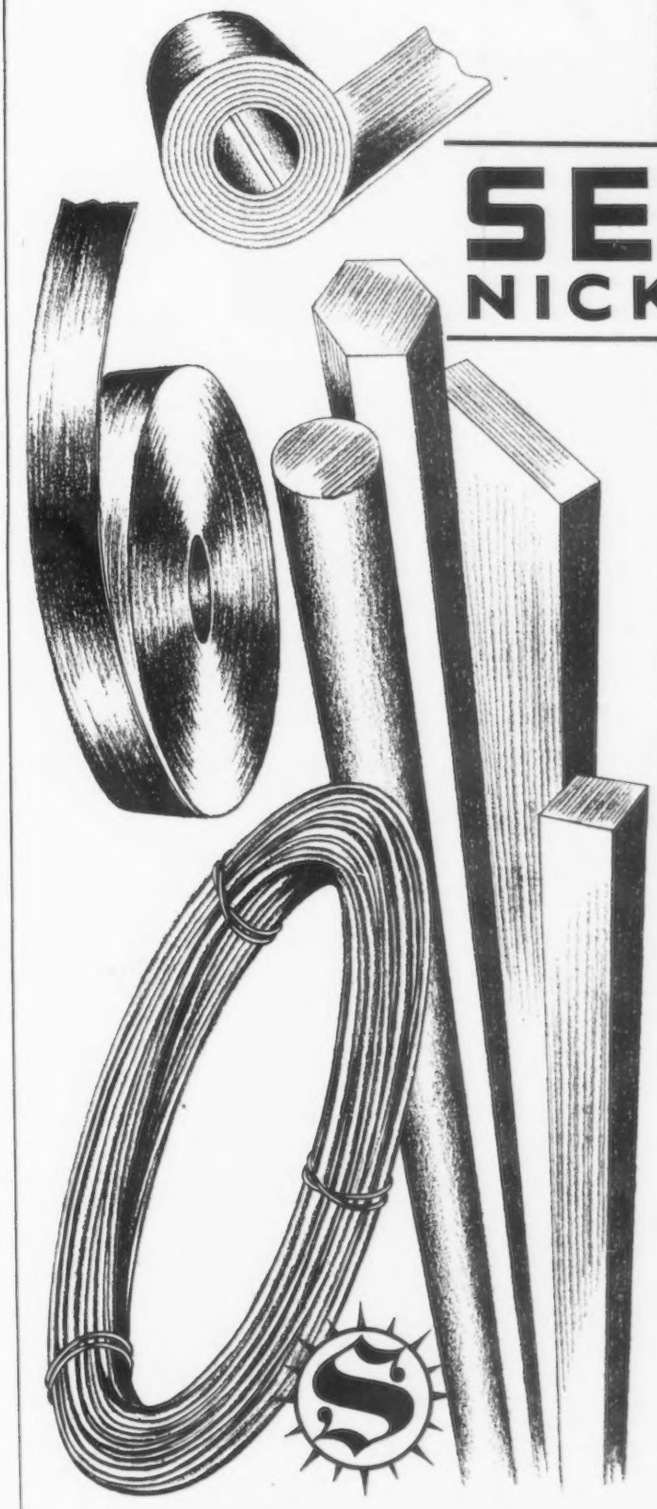
Acetylene Welding Trust, Soviet Russian Government, Moscow, has begun erection of new plant at Leningrad for manufacture of welding equipment, acetylene gas and commercial oxygen. First unit for production of welding apparatus is scheduled for completion this year. Entire project will cost 1,500,000 rubles (about $750,000). Expansion will be carried out at commercial oxygen plant at Krasnoyarsk, Siberia. Cost 800,000 rubles (about $400,000) with equipment. Automobile Trust plans erection of 30 automobile repair plants of standardized type during 1932, with 18 overhauling and reconditioning bases for automobiles and motor trucks, 19 vulcanizing shops, and about 135 smaller service and repair works, in different cities. Cost over $1,000,000 with equipment. Amtorg Trading Corpn., 261 Fifth Avenue, New York, official buying agency.

Roan Antelope Copper Mines, Ltd., London, England, is arranging sale of stock to total about $875,000, portion of proceeds to be used for development of copper properties in South Africa, where operations recently were started, including increased production facilities.

New Alloy Steel to Aid Seamless Tube Industry

A new alloy steel is announced by the Crucible Steel Casting Co., Cleveland. It is known as Crusco Steel and was developed by Dr. Frederick K. Bezzenberger, technical director, Cosma Laboratories, Cleveland. It contains chromium, vanadium, tungsten, cobalt and nickel, but no detailed composition is given.

Several broad claims are made for its use, particularly for piercing points and rolling mill plugs in the seamless tube industry. It is stated by Homer Tielke, secretary of the Crucible company, that its application in this industry has resulted in four radical changes. Among these are a reduction of 75 per cent in tooling cost and a decrease in the percentage of scrap tubing. These two factors will enable the seamless tube industry to compete on a more equal basis with welded pipe, according to claims. "One of the big items of cost in the seamless tube industry has been the tooling cost," says Mr. Tielke.



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Welds in High-Pressure Vessels

(*Concluded from page* 343)

A.S.M.E. boiler code. For Class 1 vessels with Grade A welding, T becomes the tensile strength of the plate which is assumed as 55,000 lb. per sq. in., and E becomes 30. The allowable working fiber stress according to the formula becomes 11,000 lb. per sq. in., whereas the A.S.M.E. regulations would permit 9900 lb. per sq. in. For Class 2 vessels, assuming the same strength of plate, the permissible fiber stress according to the formula becomes 9200 lb. per sq. in., as compared with the 8800 lb. per sq. in. allowed by the A.S.M.E. formula. In the above, an elongation of 20 per cent was assumed. For Class C vessels, still keeping the strength of the plate at 55,000 lb., the permissible fiber stress by the formula becomes 6500 lb., whereas the allowable stress according to the Code is 8000 lb. per sq. in. for the double-welded butt joint. It can be seen, therefore, for all except the Class 3 vessels, the formula is more liberal than the A.S.M.E. regulations.

Some fatigue tests have been made on drums and shells made from heavy plates by arc welding, which would meet the requirements for Class 1 vessels. These test vessels were subjected to pressures ranging from zero to 150 per cent of the design working stress. It was found that the welding did not weaken the fatigue strength of the shell, and that joints could withstand 400,000 cycles of stress with the above ranges without failure.

Ductility of Welded Joints

The importance of ductility of the welded joints in the construction of pressure vessels has been emphasized by the two preceding sections. The question of ductility is also, in a measure, tied up with "locked up stresses." A number of important and practical methods have been developed to secure greater ductility where this seems to be desirable. Several of the larger companies that are welding vessels for the oil and chemical industries regard their processes as more or less secret. However, the generally recognized procedures for obtaining increased ductility are outlined below:

Arc Welding: The method outlined is applicable with automatic or hand operations. A flux covered wire which has a suitable covering to protect it from the oxygen of the air is generally employed. High current values are generally used. The metal is kept in a molten or puddled state as long as possible, but in this condition the molten metal is protected by a slag coating furnished by the covering on the electrode. The welding material is deposited in a large number of layers, with each layer not exceeding 3/16 in. in thickness. Each layer is carefully cleaned before depositing the successive layer. It can be seen, therefore, that in the welding of 2-in. steel some 10 or 12 layers would be necessary. With the high currents employed, and especially for automatic machinery using a relatively large electrode, magnetic control of the arc is also utilized. While fairly good results can be obtained with bare wire using a high current and a larger number of layers, nevertheless for the best results a flux coating on the wire which affords protection from oxidation is necessary. The sequence of the deposition of these layers is also important. The necessity for annealing the entire structure has already been covered in detail. Each layer is generally peened while hot.

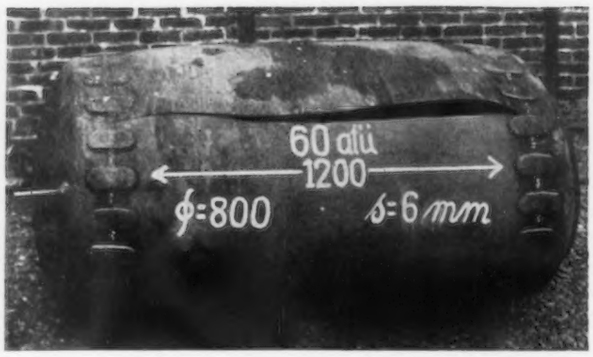

FIG. 10.—A method of strap enforcement used in Europe but not applied to any great extent in this country.

Gas Welding: A vessel constructed under rigid procedure specifications by the gas welding method will be entirely safe and the weld metal possesses excellent properties as to ductility and tensile strength. Special wires may be used to obtain greater strength or ductility of the welded metal deposit where this is desirable.

Protecting Weak Spots in Open-Hearths

(*Concluded from page* 339)

was dangerously thin. We could not renew it because the roof was worn so thin that to cool it down sufficiently to make the repair would have caused it to collapse; yet, kept hot, the roof would last safely for a number of heats.

According to the volume of business on books and the schedule of shipment of the product, we figured that we must keep the furnace in production for about 75 heats. To have taken it off and started another furnace in its place would have involved an expense of several hundred dollars. It was the expense of starting up a furnace, and shutting it down again after a short run, that we wanted to avoid.

I had been experimenting with chrome ore for some time prior to the occasion when we were faced with this problem. And with renewed effort I set about the task of accomplishing what seemed impossible. Over the week-end we built up the jambs nearly to the arches, but the material crumbled down before the week was half gone. However, the base of the banks we built remained throughout the week, and the next week-end we built them up again.

On Monday the material had the appearance of a well burned clinker, and withstood the high heat as well as the seasoned refractories. And we were enabled to continue the furnace in production for 125 additional heats. Roughly, this saved us $1,200 in refractory costs, while the material we used cost but $100.

Welding and Cutting Accident Prevention

In an effort to reduce accidents in the petroleum industry caused by lack of adequate precautions and information concerning gas and electric welding, cutting, and burning, as well as the use of open fires in mechanical operations, the American Petroleum Institute, 250 Park Avenue, New York, has published an "Accident Prevention Manual on Gas and Electric Cutting and Welding." It covers health and accident hazards, discusses the problem of training new workmen and overcoming carelessness in others, and outlines the various applications of gas and electric welding in the petroleum industry. The price of the manual, 16 pages, 8x10½ in., is 25c.